Data Migration Training

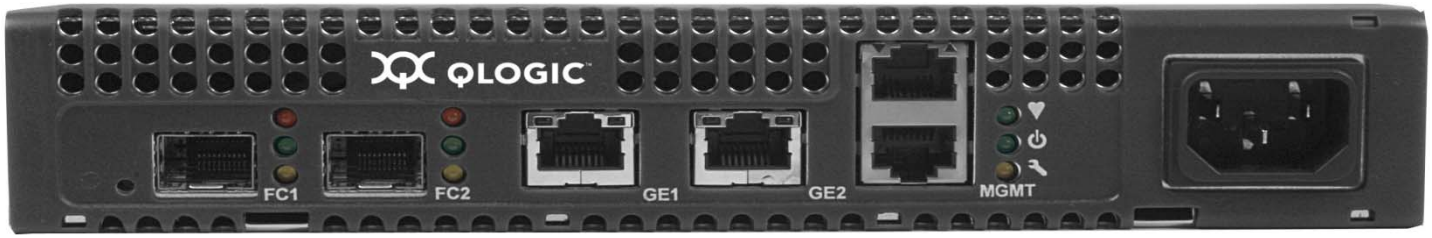
April 27, 2009

Agenda

- **Background - Data Migration Service (DMS)**
- **Features**
- **Definitions: Data Migration Objects**
- **Data Migration using 6140 DMS**
  - Step-by-step instructions
  - Live demo
- **Questions, Answers, Feedback**

QLogic Data Migration Service

- Deployed on 6140 using firmware upgrade
- Hardware shipping since Feb ‘06
- Offline Data Migration Service
- Data Migration for low-end to high-end FC storage arrays
- Now deployed by HP, NEC



6140 Overview

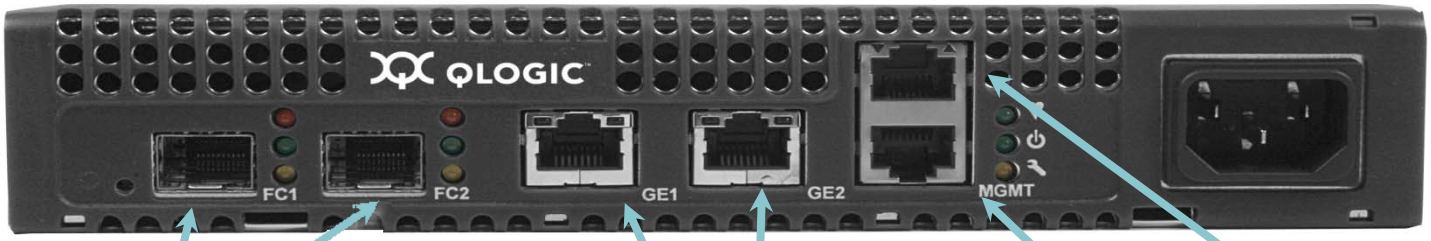
Compact 1u high half-rack package

Dimensions: 7” x 15” x 9.6”

Weight: 6 lbs

Power: 48 Watts

I/Os per second: 35,000



(2) 2Gb FC ports for Data Migration

(2) 1GbE ports (not used for DMS)

Ethernet management port

RS-232 management port

Simple Offline Data Migration

- Simple to use
- Fast install and configuration
- Offline migrate up to 1TB/hr
- Low Cost, DM Service for SME to Enterprise customer

OFFLINE
Server "C" w/ LUN 3

OFFLINE
Server "B" w/ LUN 2

OFFLINE
Server "A" w/ LUN 1

FC SAN

6140

Data Mover Commands

DATA PATH

Old array

LUN 3
LUN 2
LUN 1

Migrated LUNs

New LUNs

LUN 5
LUN 4

LUN 3
LUN 2
LUN 1

New HP storage system

Features

OS, Fabric and Array Agnostic

- **OS Independent**
  - Network based, Block level Data Migration
- **Fabric Independent**
  - Built on proven QLogic FC HBA ASIC technology
    - Millions of deployed ports
  - Fully compatible with Brocade, Cisco, McData and QLogic FC fabrics
  - Tested and certified fabric interoperability
- **Supported on most FC arrays**

Features [continued]

- **GUI / CLI based remote management**
  - Project can be managed and monitored remotely
  - Simple Drag & Drop for job configuration
  - Intuitive Wizards
- **Flexible scheduling of Data Migration Jobs**
  - Run Now, Schedule, Serially execute
  - Up to 255 Jobs can be scheduled
- **User defined Job Groups**
  - Migration Jobs can be categorized in 8 user-defined groups

Features [continued]

- **Protection**
  - Will not allow overwriting a Source LUN
  - Warning if destination LUN seems to have valid data when creating a new Migration Job
  - Job acknowledgement ensures job integrity
- **Data Verification Option**
  - Compares byte-byte data (at block-level) between Source & Destination
- **Array Bandwidth Throttling**
  - Protects application and server performance by not overloading array with migration jobs

Features [continued]

- **Migration Logs**
  - Detailed records of every job
  - Export logs as .csv for record keeping and can be viewed by Microsoft Excel
- **Licensing Options**
  - Per TB based OR Array based

    Both types can be used on a single project
  - Can be refilled at any time
  - Pay as you go model

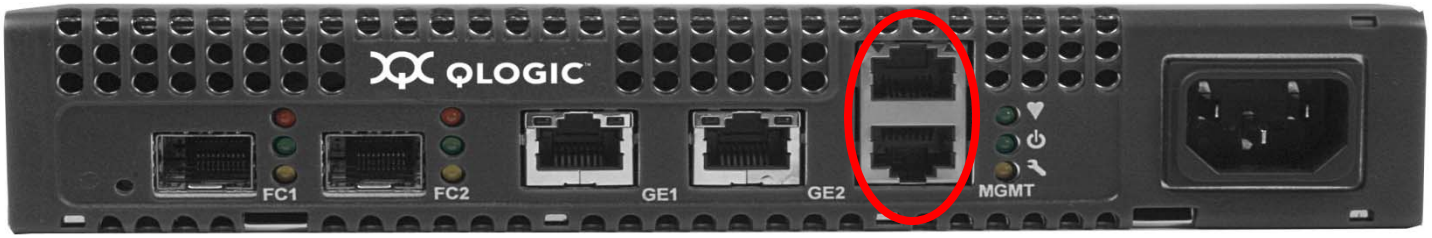
DEFINITIONS:
Data Migration Objects

Data Migration Objects

- Storage Arrays
- Jobs
- Groups
- Migration Logs
- Licenses

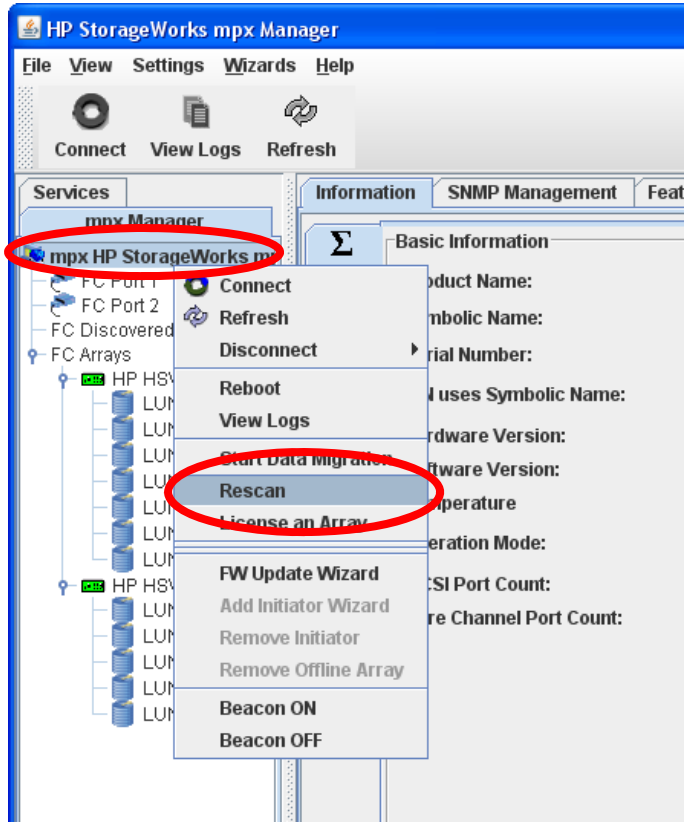
Accessing the 6140

- **Connect to serial or Ethernet port**
  - Use Ethernet with GUI
  - Use Serial with CLI or GUI
  - Default address is 10.0.0.1
- **Load GUI software on your laptop or local system**



Storage Arrays

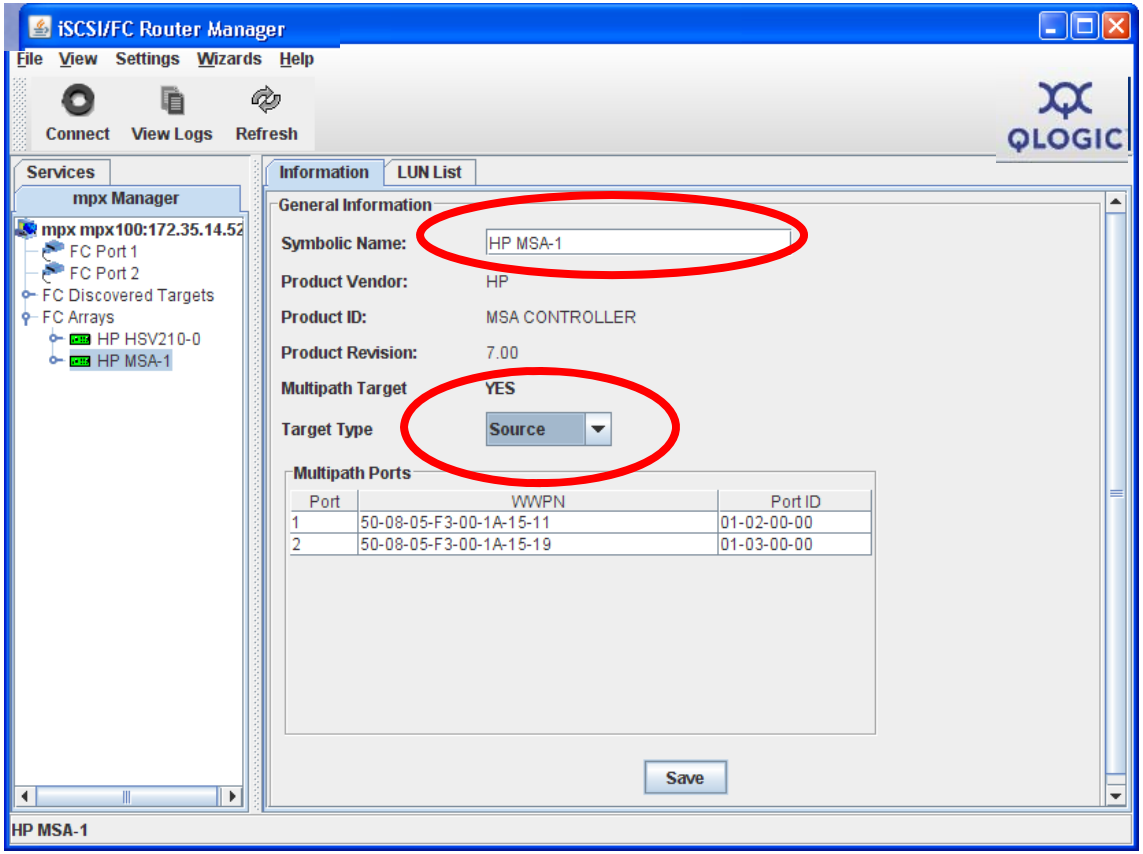
- An "**Array Object**" is formed only after one or more data LUNs are seen by the 6140
- Arrays can be discovered using "target rescan"
  1. Right-click on router
  2. Select "Rescan"



Array – Properties [continued]

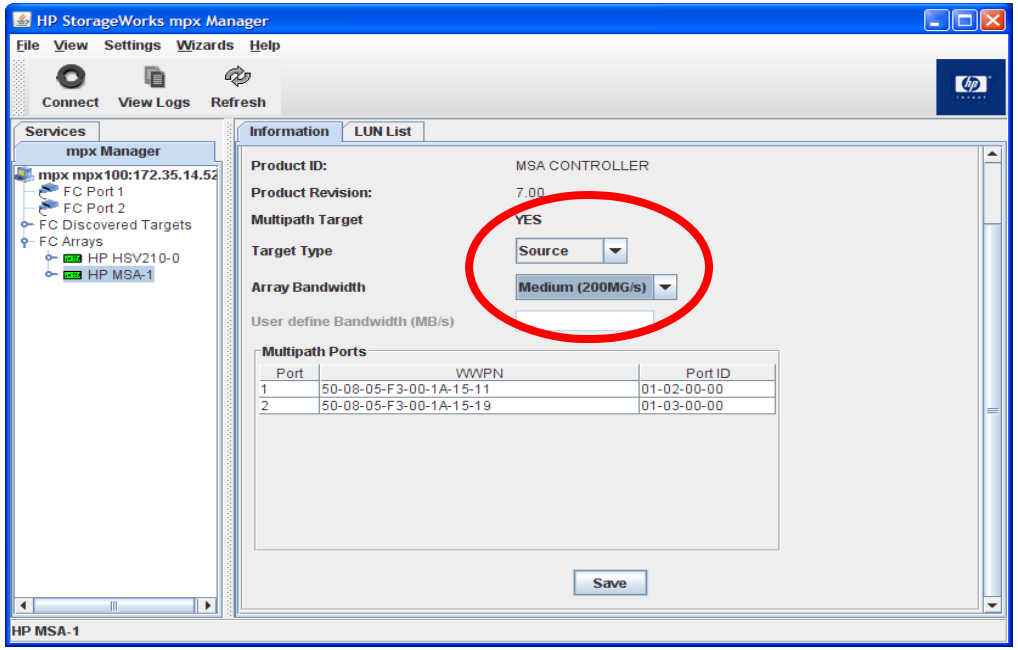
- **Symbolic Name**
- **Target Type**
  - Source
  - Destination
  - SRC+DST

    (Not recommended)
- **"Save" will save this array in persistent storage**



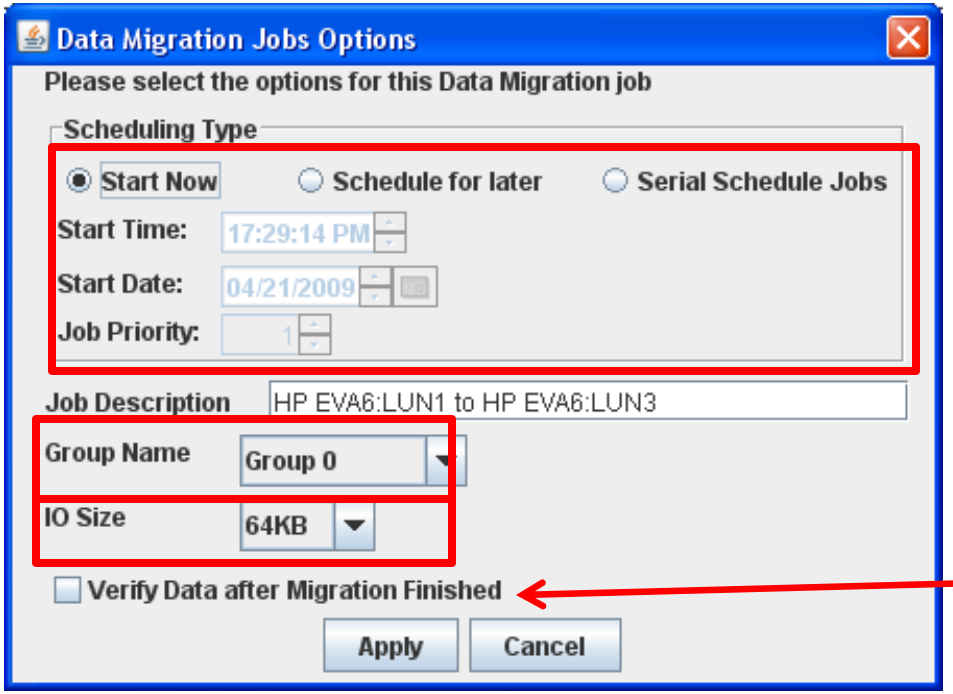
Array – Properties [continued]

- **Array bandwidth**
  - Sets the maximum bandwidth that the 6140 will consume from the source array
  - For ‘Source Only’ arrays



Job Attributes

- Scheduling
- Group
- IO Size
- Verify



Not recommended unless required by customer!

Verify Option

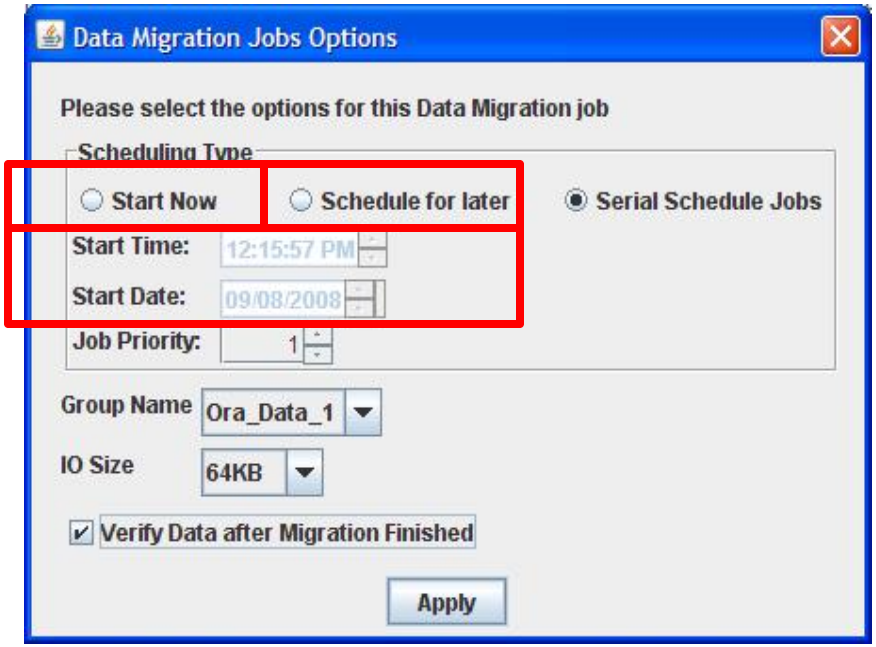
- **Compares Source LUN image to Destination LUN image**
  - Does NOT confirm the integrity of the data!
- **Performs byte-for-byte comparison between SRC and DST**
- **Increases DM project time by ~3x**
  1. Source read and Dest write (normal migration)
  2. Source read after migration completed
  3. Destination read after migration completed
  4. Image comparison

Verify Option

- **Use GUI Verify option if required by customer and/or project**
- **Use CLI to verify after project completion, if needed or desired**
  1. Telnet into 6140
  2. 6140 #> compare_luns add
  3. Follow prompts to set-up compare (see User's Manual)

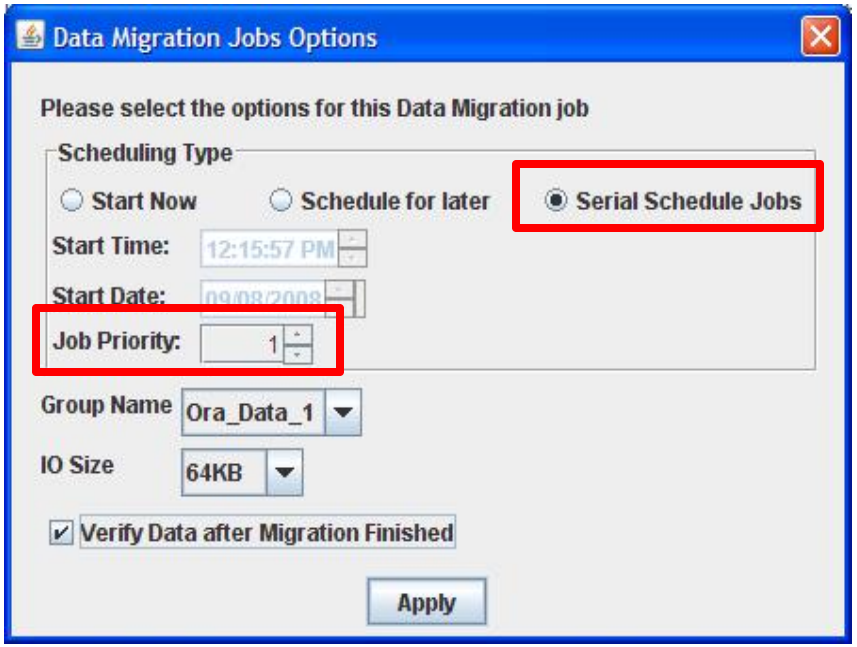
Job Attributes: Scheduling

- **Start Now:**
  - Job starts immediately
- **Schedule Later:**
  - Job starts at the specified time within next 30 days



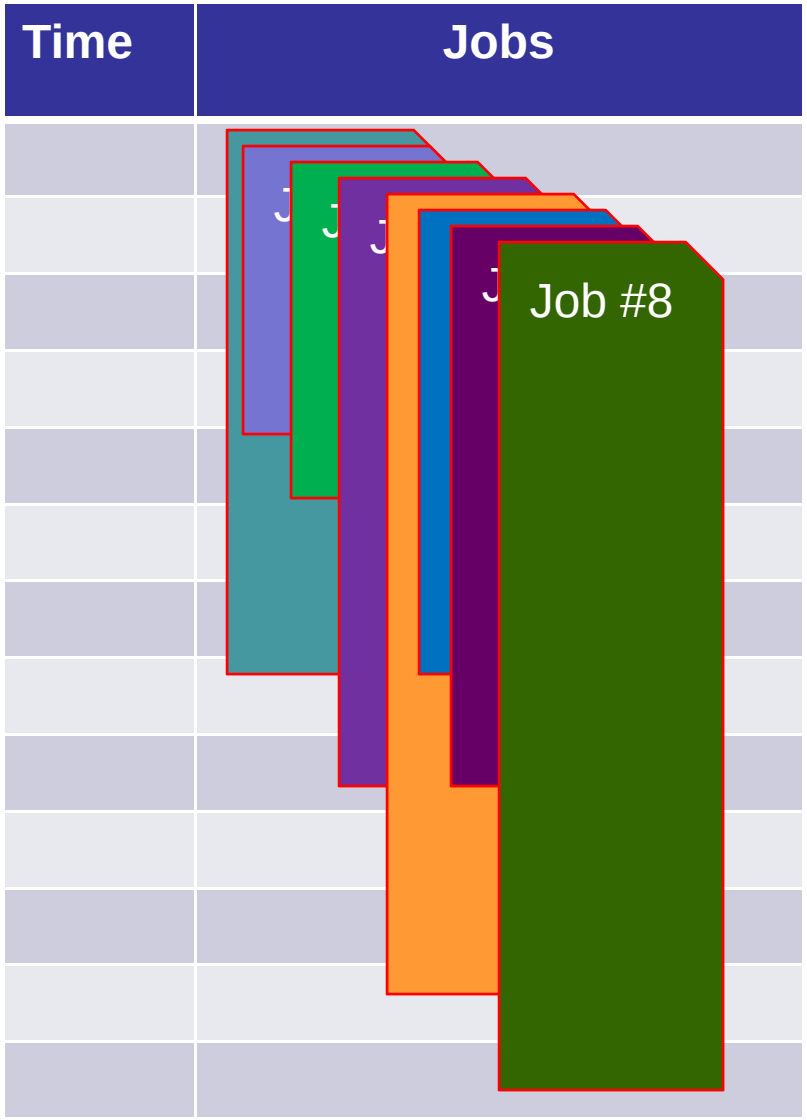
Job Attributes: Serial scheduling

- **Designed to achieve optimum performance with full flexibility for multiple migration Jobs**
- **Each Serial Job has a priority between 1-255**
  - 1 is highest, 255 is lowest
- **All jobs with same priority run simultaneously**
- **Configure multiple jobs with this option**
  - Typically 4-8 jobs per array on the same priority
  - Equal size jobs on the same priority



Scheduling: Start Now

- **“Start Now”**
  - Multiple jobs will run simultaneously without priority
  - Start running as soon as it is configured
- **Best for a small number of jobs per array (e.g. 4 – 8)**

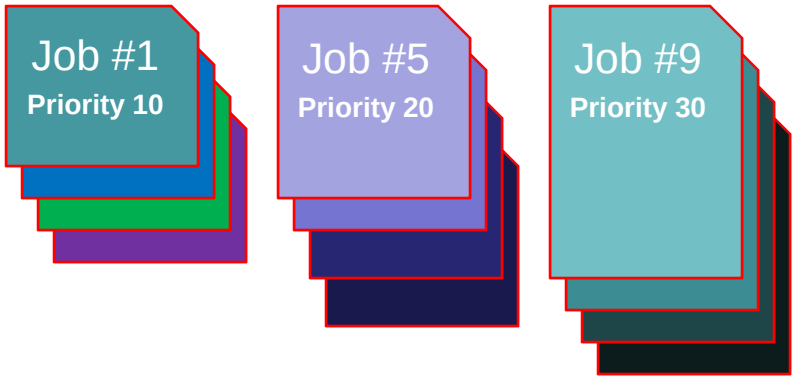


Scheduling: Schedule Later

- **Configure each Job to run at a scheduled time during “off-peak”**
- **Best to use when jobs are of different sizes**
- **Careful scheduling consideration required to maximize array bandwidth**
- **Limitations**
  - Unused bandwidth
  - Overlap bandwidth

Serial Scheduling

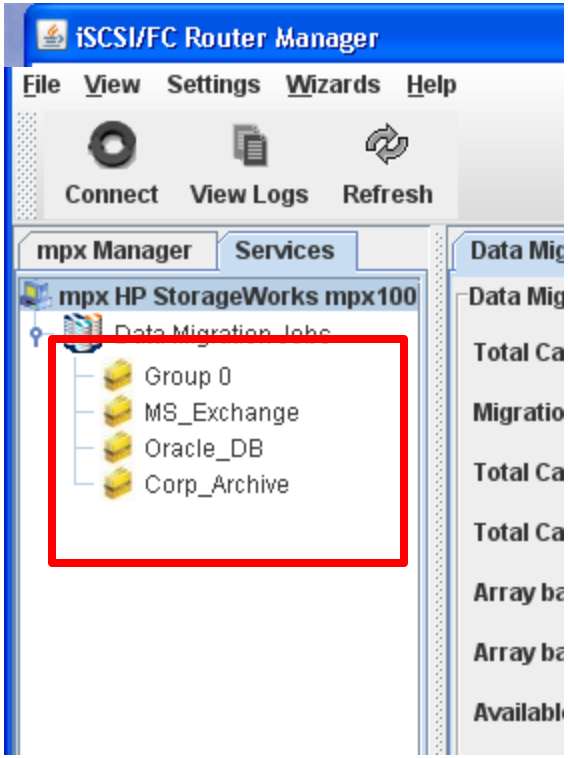
- Create equal-size jobs with the same priority
- Serial Schedule wizard allows “Start Now” or “Schedule Later”
- Once the high priority jobs complete, next priority jobs start



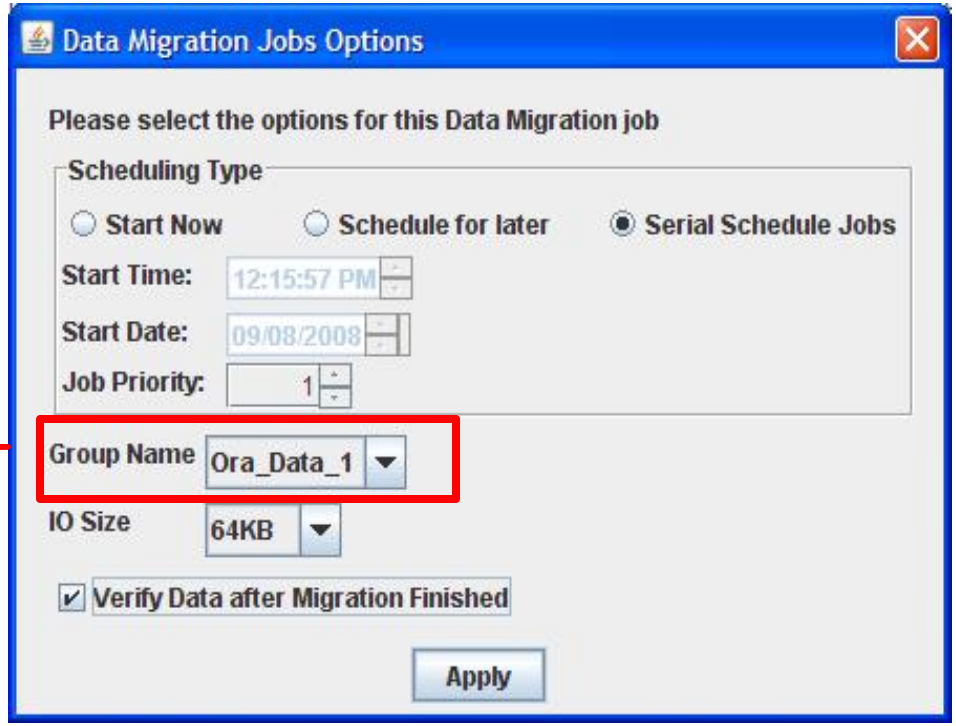
Time	Jobs			
6:00 PM	Job #1 Priority 10	Job #2 Priority 10	Job #3 Priority 10	Job #4 Priority 10
	Job #5 Priority 20	Job #6 Priority 20	Job #7 Priority 20	Job #8 Priority 20
	Job #9 Priority 30	Job #10 Priority 30	Job #11 Priority 30	Job #12 Priority 30

Job Attributes: Group

- Up to 8 User defined “Groups”
- Provides “buckets” for jobs
- Scheduling is done at the job level, not the group level

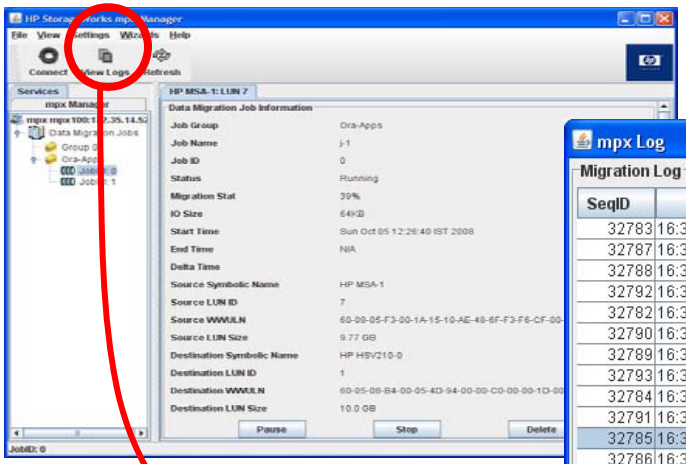


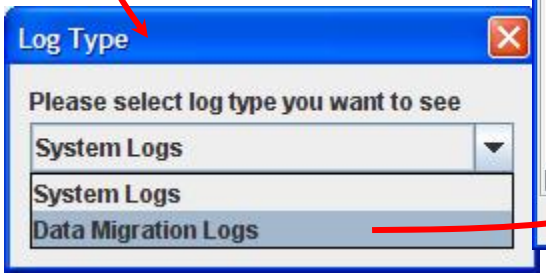
Group 0
Exchange
Database
Archive
Etc.

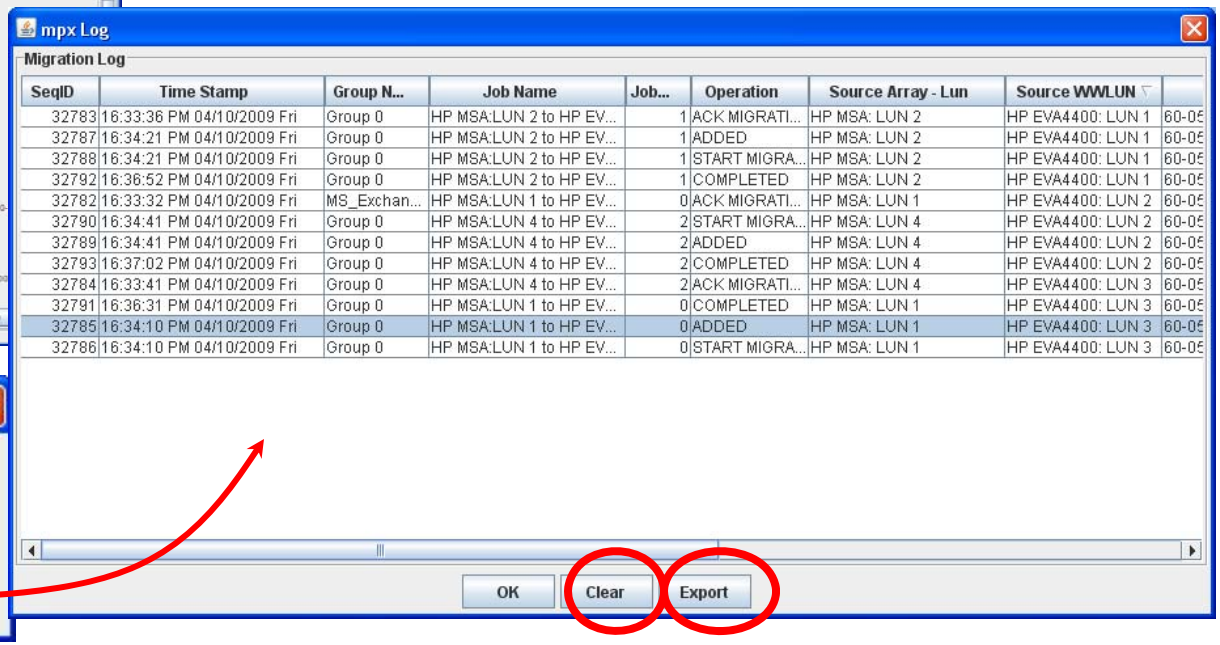


DM Logs

- **Accessed from ‘View Logs’ button**
- **Maximum 1024 Log entries**
  - Each job typically consumes 4 Log Entries
- **Clear Logs at the start of Project**
- **Export Logs at the end of the Project**






mpx Log
Migration Log
SeqID
Time Stamp
Group N...
Job Name
Job...
Operation
Source Array - Lun
Source WWLUN
32783 16:33:36 PM 04/10/2009 Fri Group 0 HP MSA:LUN 2 to HP EV... 1 ACK MIGRATI... HP MSA: LUN 2 HP EVA4400: LUN 1
32787 16:34:21 PM 04/10/2009 Fri Group 0 HP MSA:LUN 2 to HP EV... 1 ADDED HP MSA: LUN 2 HP EVA4400: LUN 1
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32792 16:36:52 PM 04/10/2009 Fri Group 0 HP MSA:LUN 2 to HP EV... 1 COMPLETED HP MSA: LUN 2 HP EVA4400: LUN 1
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32789 16:34:41 PM 04/10/2009 Fri Group 0 HP MSA:LUN 4 to HP EV... 2 ADDED HP MSA: LUN 4 HP EVA4400: LUN 2
32793 16:37:02 PM 04/10/2009 Fri Group 0 HP MSA:LUN 4 to HP EV... 2 COMPLETED HP MSA: LUN 4 HP EVA4400: LUN 2
32784 16:33:41 PM 04/10/2009 Fri Group 0 HP MSA:LUN 4 to HP EV... 2 ACK MIGRATI... HP MSA: LUN 4 HP EVA4400: LUN 3
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32785 16:34:10 PM 04/10/2009 Fri Group 0 HP MSA:LUN 1 to HP EV... 0 ADDED HP MSA: LUN 1 HP EVA4400: LUN 3
32786 16:34:10 PM 04/10/2009 Fri Group 0 HP MSA:LUN 1 to HP EV... 0 START MIGRA... HP MSA: LUN 1 HP EVA4400: LUN 3
OK
Clear
Export

DM Log Fields

- **SeqID:** *Sequential ID of log entries*
- **Time Stamp:** *Log entry time, based on router system time*
- **Group Name:** *User-defined job group or ‘Group 0’*
- **Job Name:** *User defined*
- **Job ID:** *Numeric ID*
- **Operation:** *Task or action (added, started, completed, ACK)*
- **Source Array LUN:** *Migration source LUN*
- **Dest Array LUN:** *Migration destination LUN*
- **Source Array WWLUN:** *WW LUN ID*
- **Dest Array WWLUN:** *WW LUN ID*
- **Migr Size:** *Size of Migration job (source LUN)*

License Keys

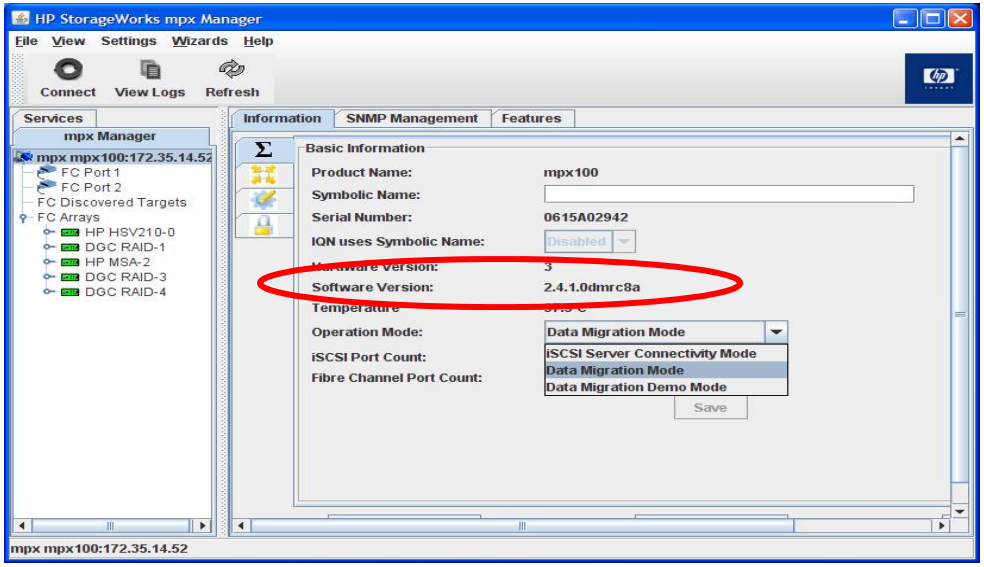
- **Per-TB Licenses**
  - Any capacity from 2TB to 256TB
  - “Fills the gas tank”. Unused capacity will be available for next job
  - Can be installed at anytime, adding new license doesn’t overwrite remaining license capacity
- **Per-Array Licenses**
  - 1-array
  - Unlimited DM for a specific array
    - Many sources to one target, e.g. storage consolidation
    - One source to many targets, e.g. data replication
  - Can’t be re-used or re-allocated to another array
  - Can be installed at anytime on 6140
  - Should be administered onsite
  - Max 32 “active” array licenses at a time

Data Migration using 6140

Step-by-step Procedures

Converting 6140 for DM

- **Verify f/w 2.4.1.0dms or later**
- **If older version, contact QLogic**
  - New firmware still allows iSCSI mode

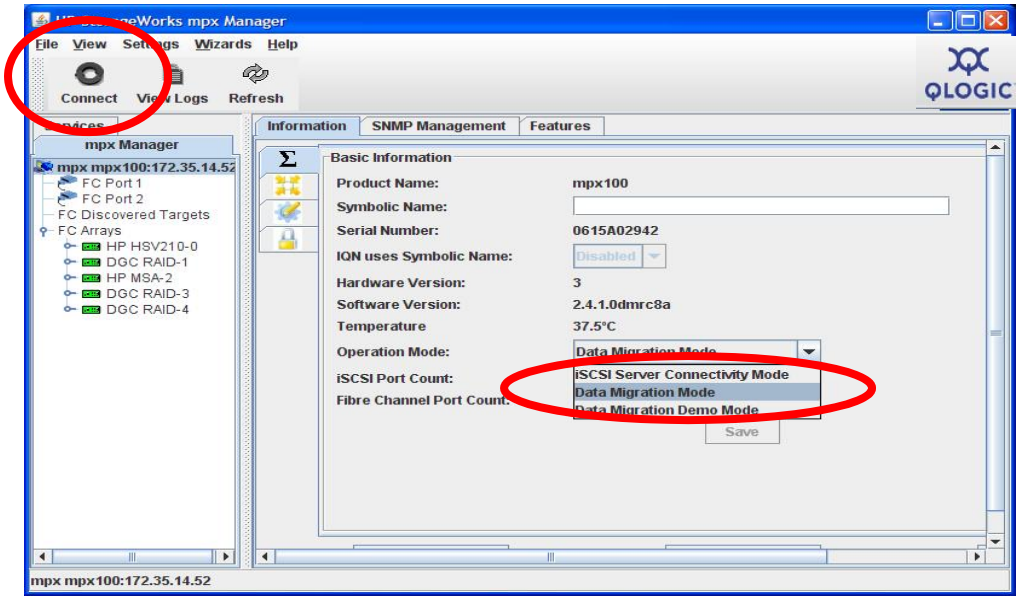


SANSuferer iSCSI/FC Router Manager

- **Load Manager on your local system and launch**
  - Connect to router IP address

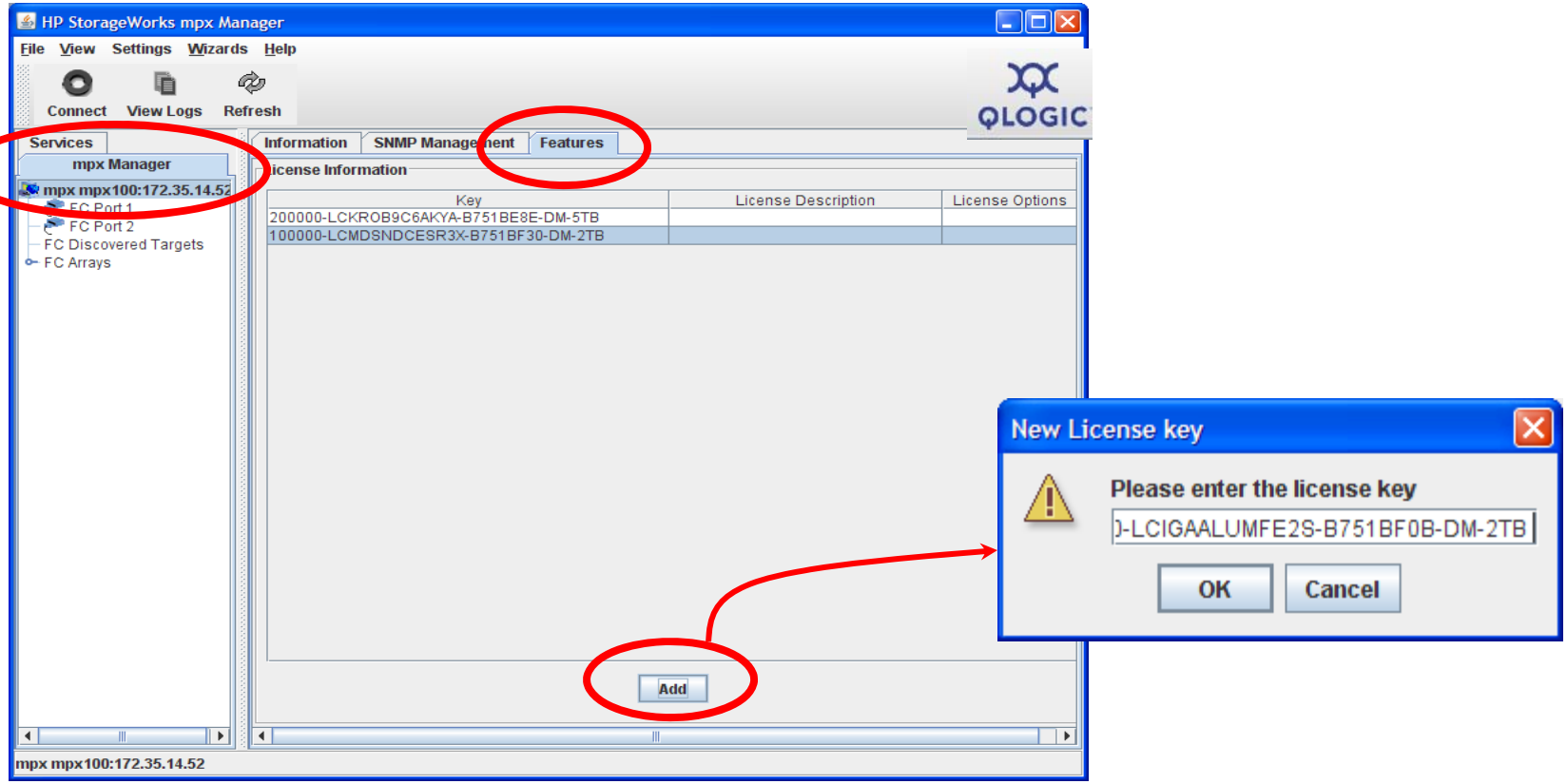
    Default Password: config (admin mode)
  - Set to Data Migration Mode

    Default Password: migration (migration mode)
- **Reboot the 6140**



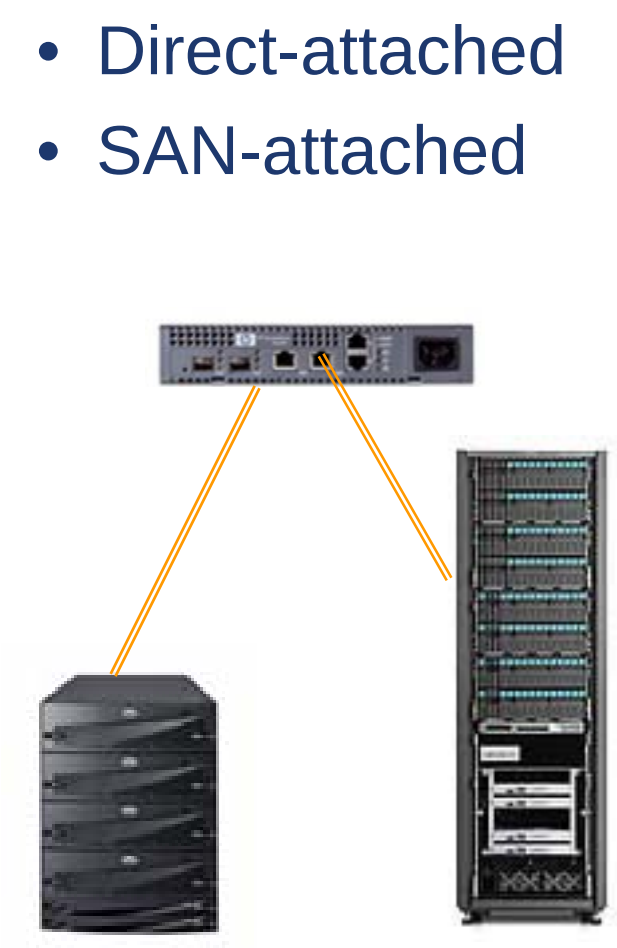
Applying License Keys

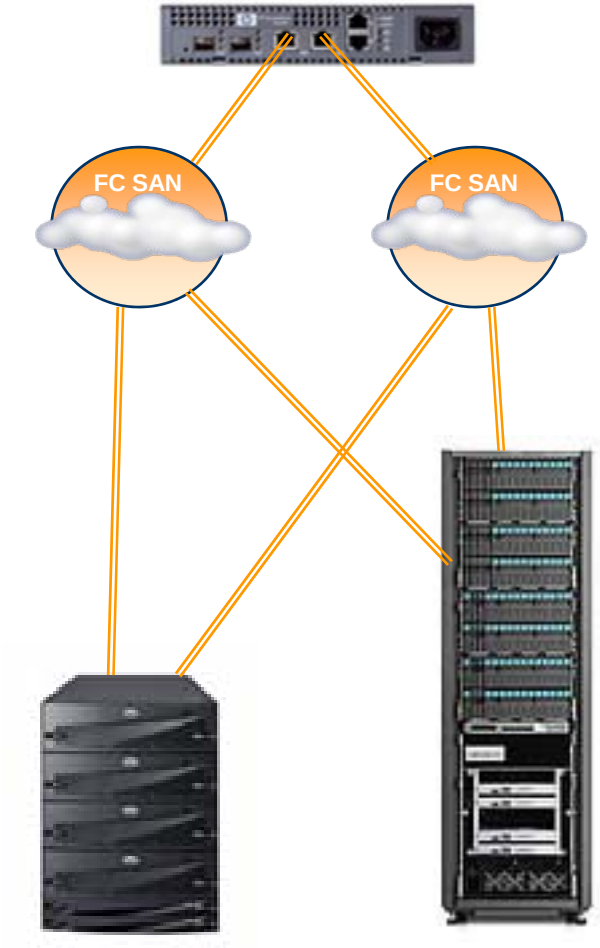
- **Select the 6140,'Features' tab, and 'Add'**
  - Enter license key provided



Data Migration Topologies

- **FC-to-FC Routing**
  - Direct-attached
  - SAN-attached

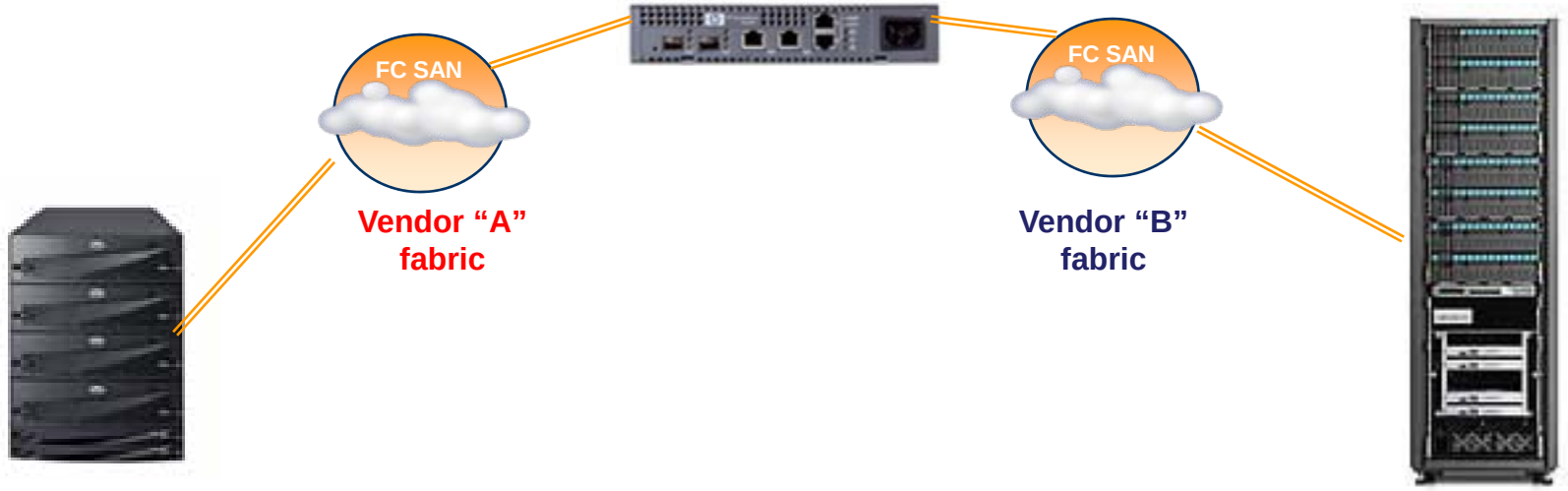




Data Migration Topologies

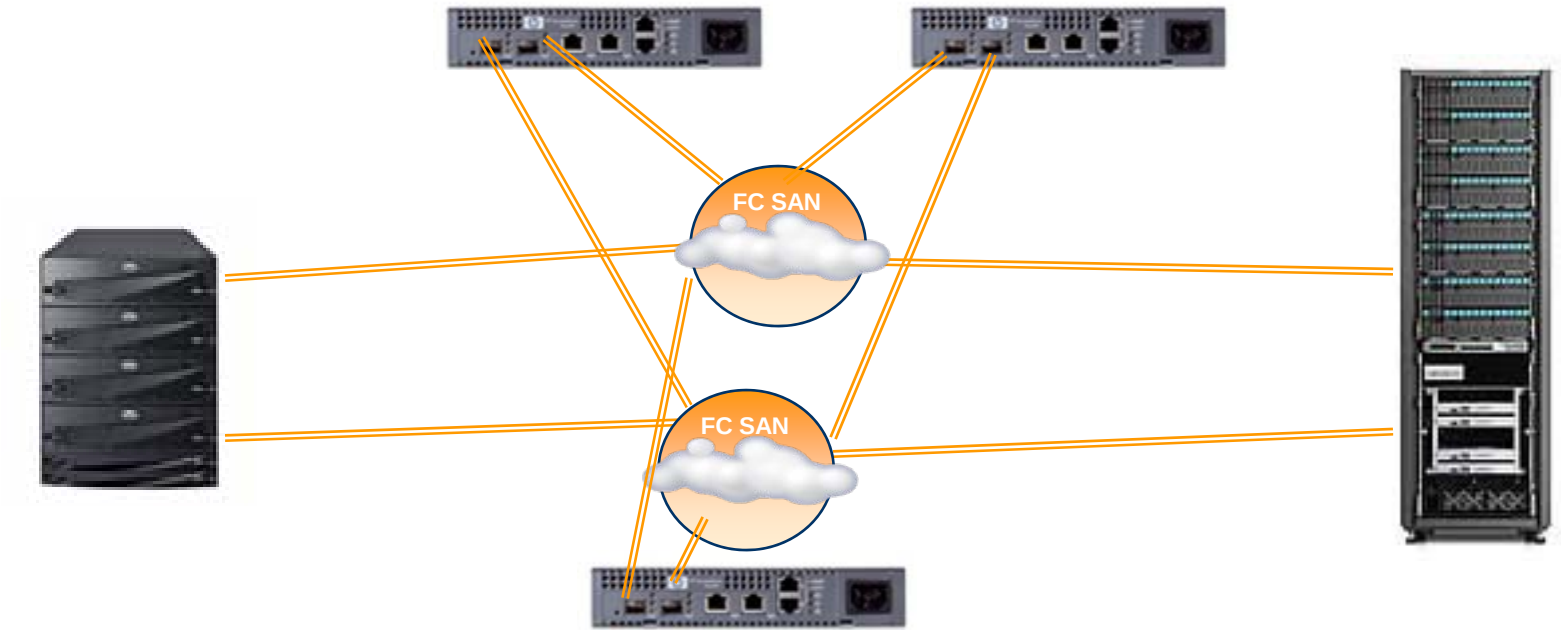
- **SAN Attached**
  - Bridging across Cisco, Brocade, McData, and QLogic

    e.g. merger & acquisition



Data Migration Topologies

- **Use more routers for increased bandwidth**
  - Limited by array controller performance



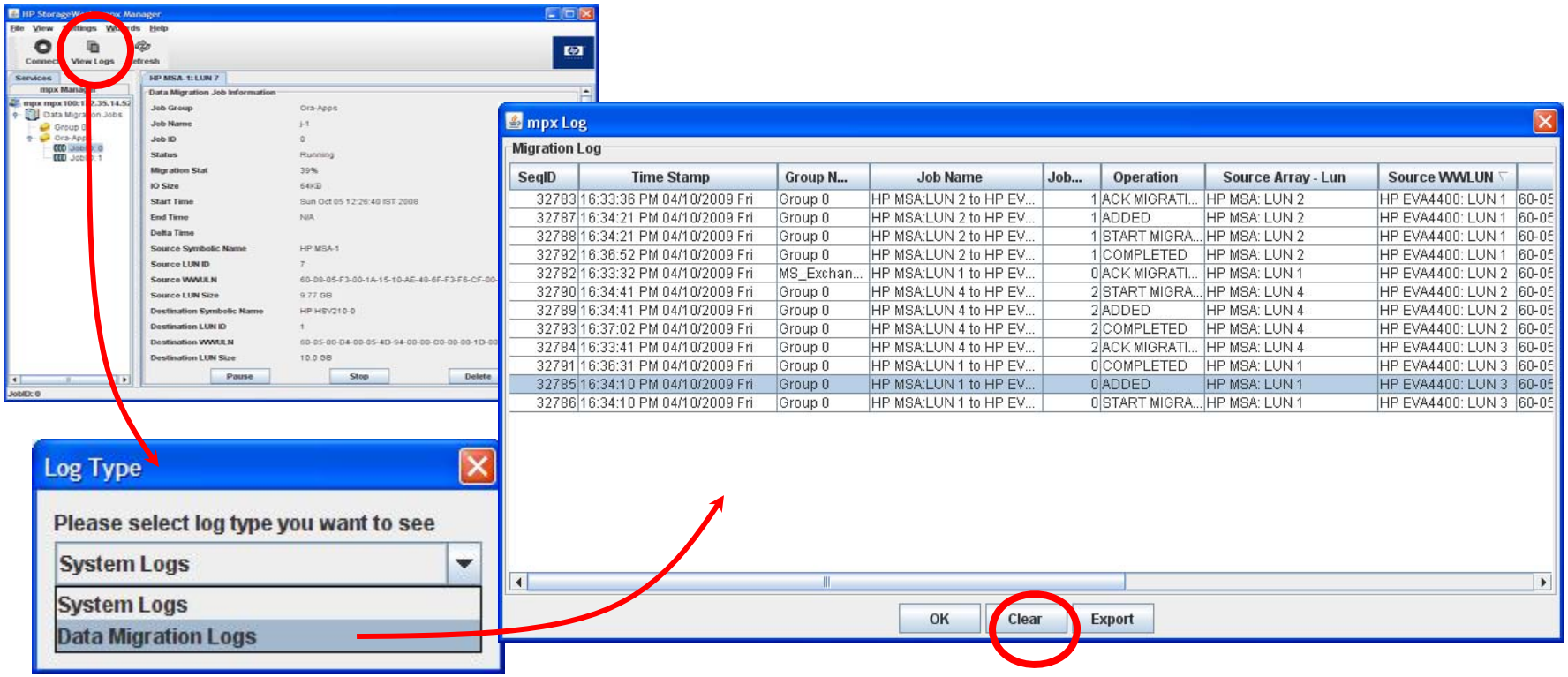
Steps

1. **Clear Migration Logs at start of project**
2. **Set array properties**
3. **Administer the Array-based License Key -**

   - if an array-based migration license will be consumed for this project, otherwise a per-TB license will be used automatically
4. **Define user groups**
5. **Configure Migration Job**
6. **Monitor**
7. **Acknowledge**
8. **Export Migration Logs**
9. **Remove arrays from persistence**
10. **License Key usage**

Clear Migration Logs

- Accessed from ‘View Logs’ button
- Clear the at the start of Project


View Logs
Log Type
Please select log type you want to see
System Logs
System Logs
Data Migration Logs
mpx Log
Migration Log
SeqID
Time Stamp
Group N...
Job Name
Job...
Operation
Source Array - Lun
Source WWLUN
32783 16:33:36 PM 04/10/2009 Fri Group 0 HP MSA:LUN 2 to HP EV... 1 ACK MIGRATI... HP MSA: LUN 2 HP EVA4400: LUN 1
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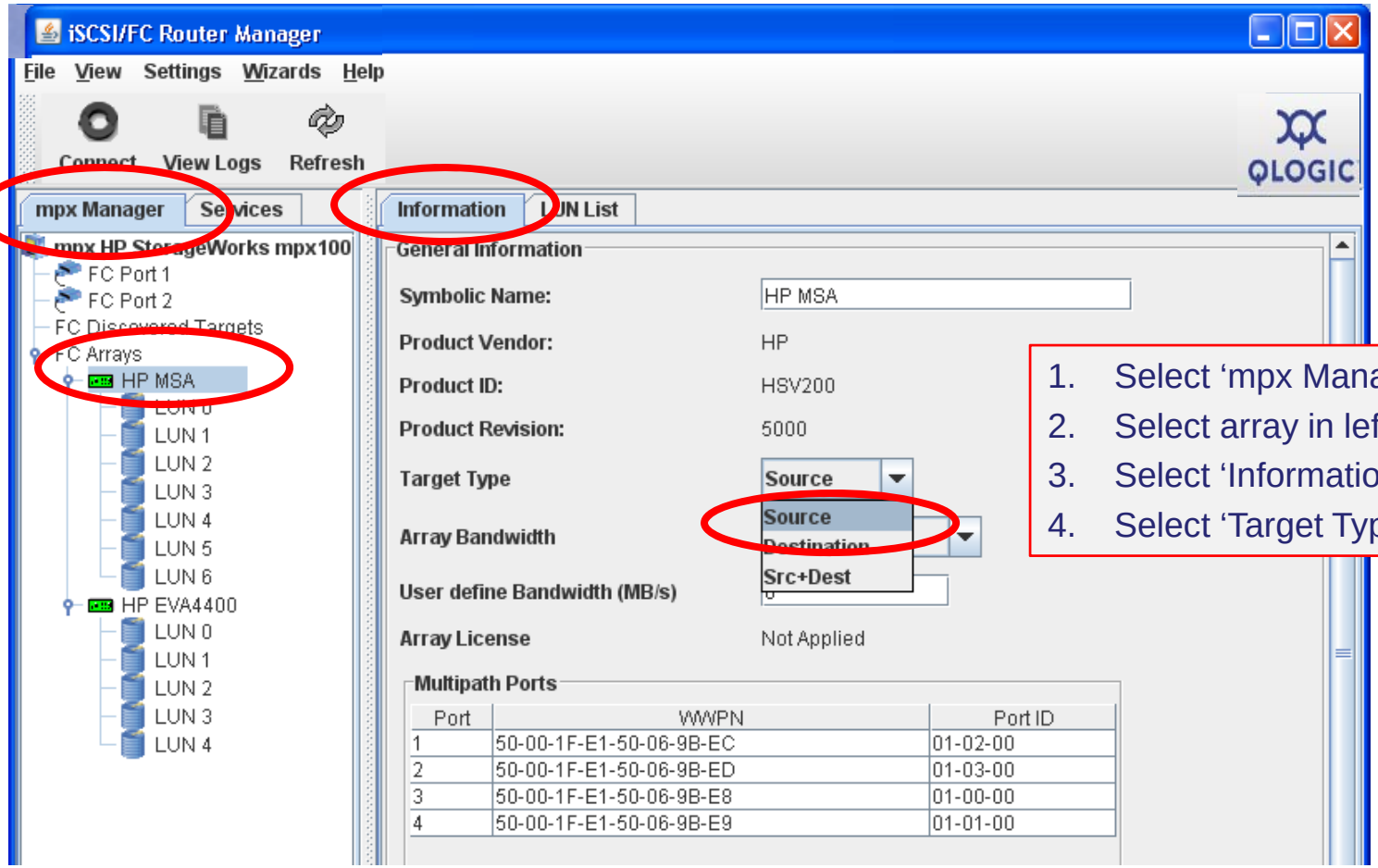
32786 16:34:10 PM 04/10/2009 Fri Group 0 HP MSA:LUN 1 to HP EV... 0 START MIGRA... HP MSA: LUN 1 HP EVA4400: LUN 3
OK
Clear
Export

Setting Array Properties

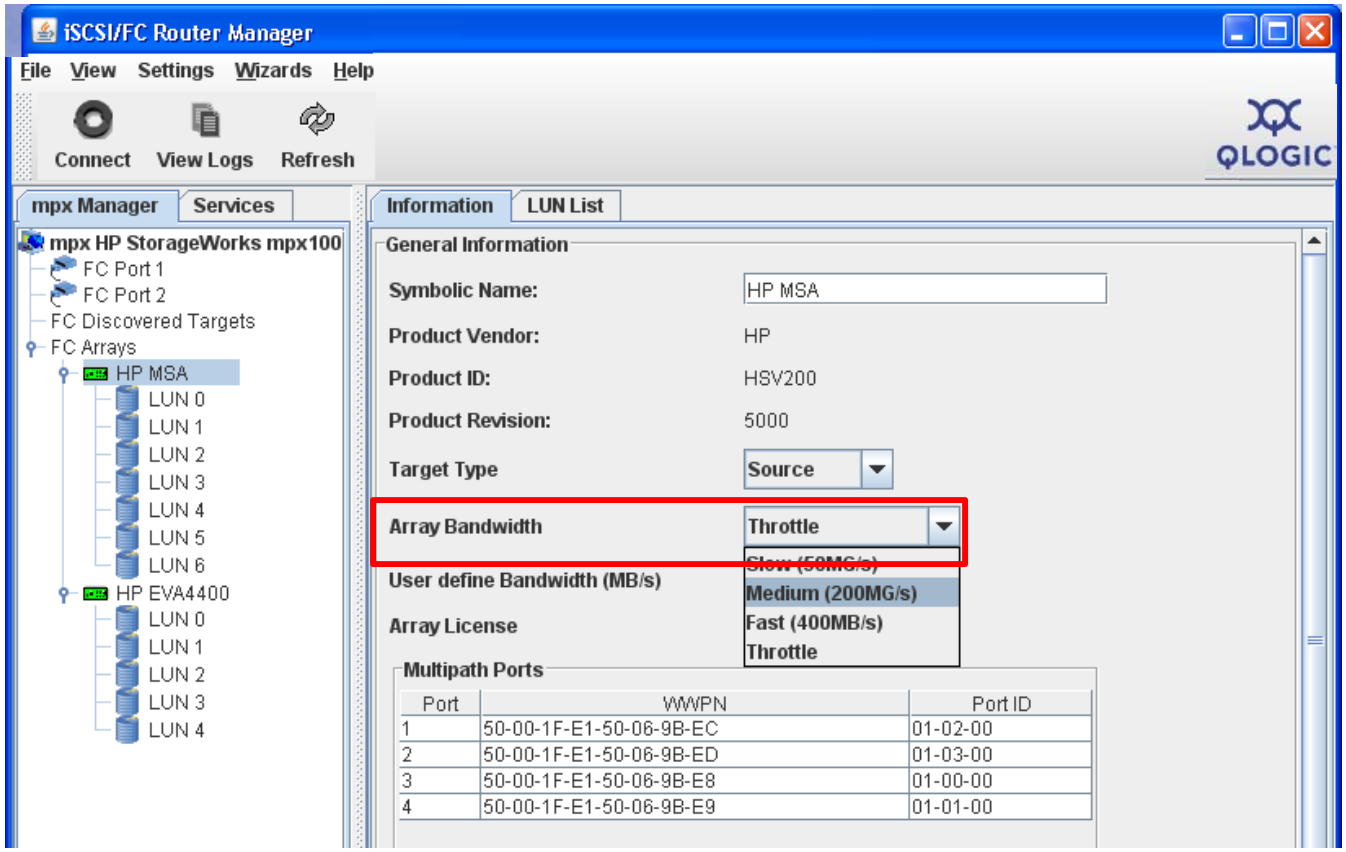
- **Select array and set to Source or Destination**



1. Select ‘mpx Manager’
2. Select array in left pane
3. Select ‘Information’ tab
4. Select ‘Target Type’

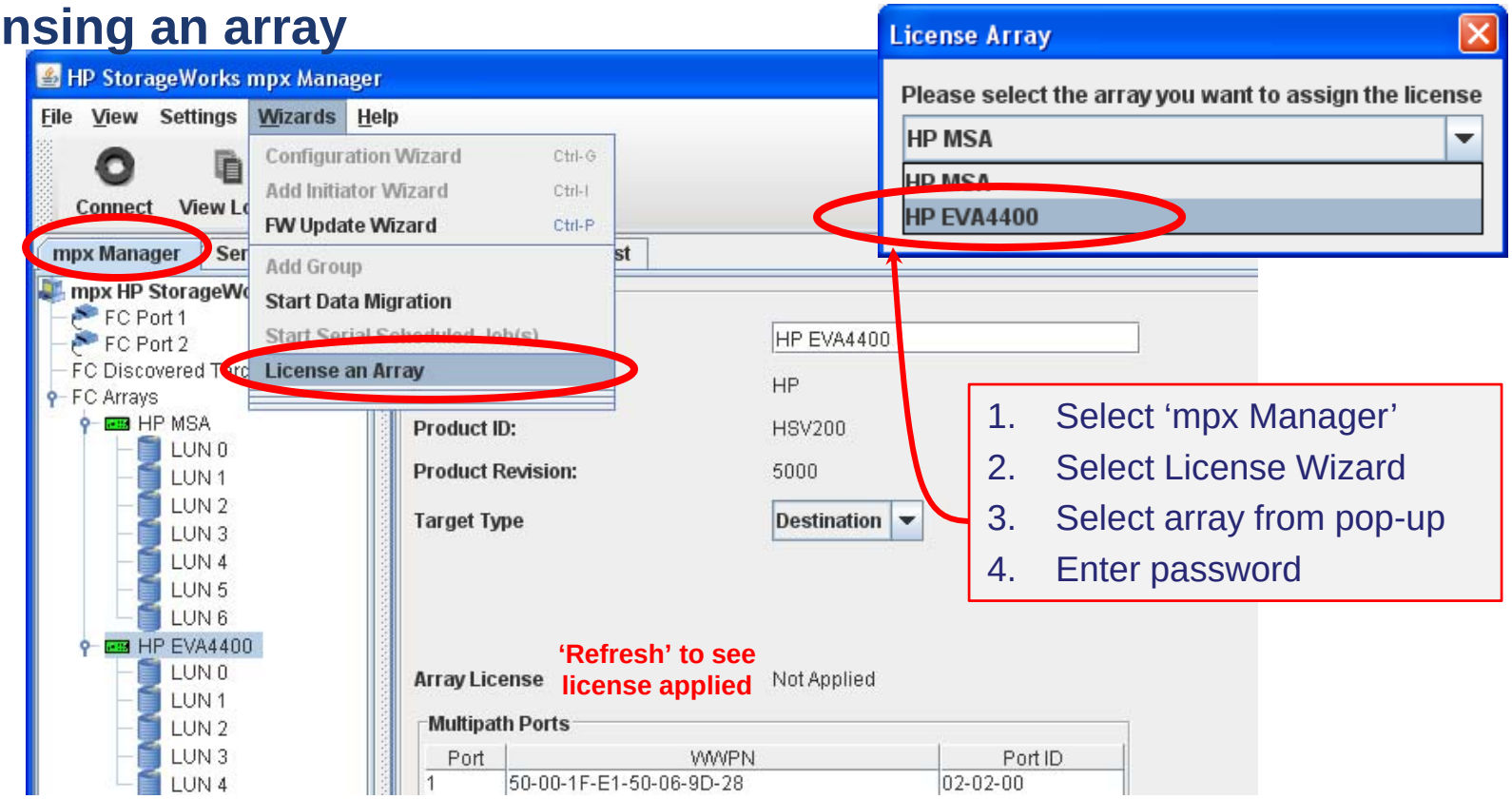
Array Bandwidth

- **For ‘Source Only’ arrays**
  - Additional drop-down after array is defined



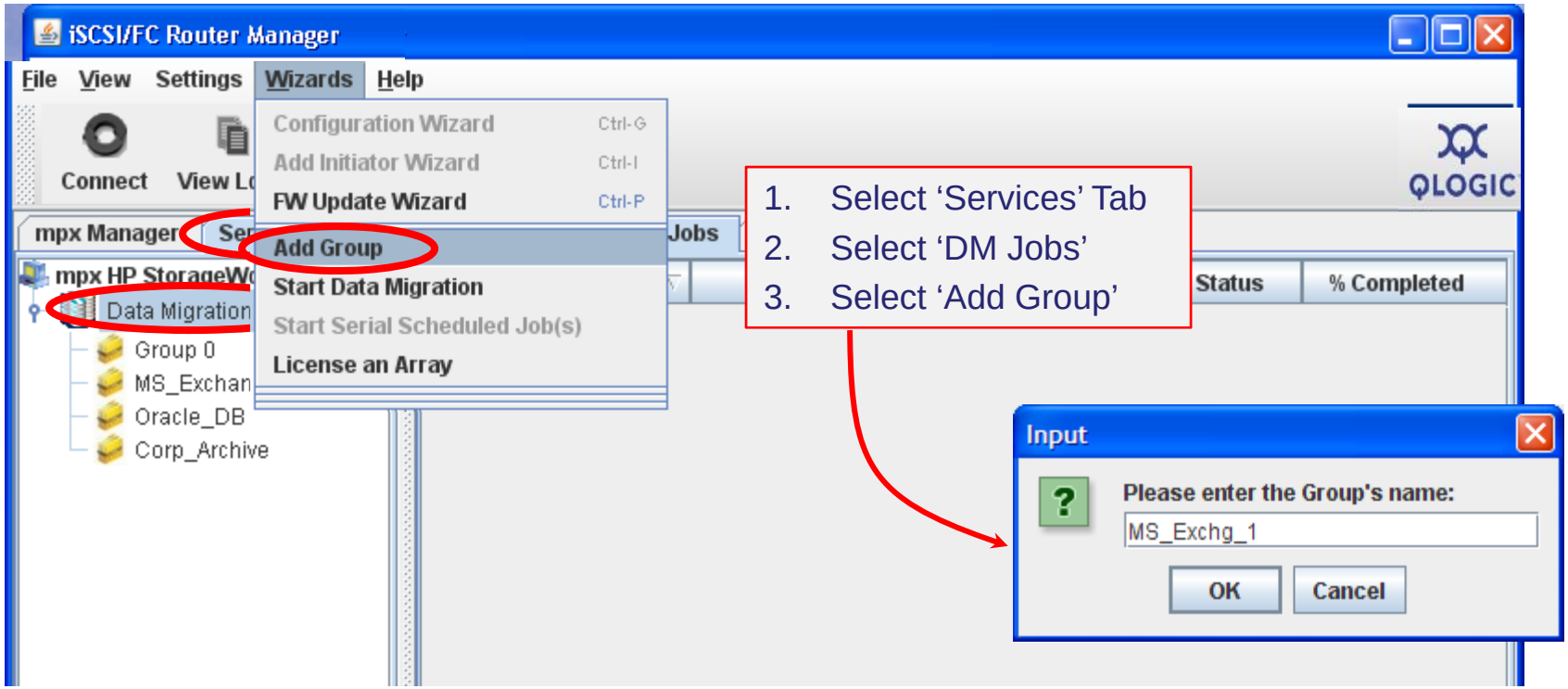
Array-based License

- **Array based license allows unlimited migration into (Dest) and/or out (Src) of this array**
- **Ensure all ports of this array are seen by the router at time of Licensing an array**



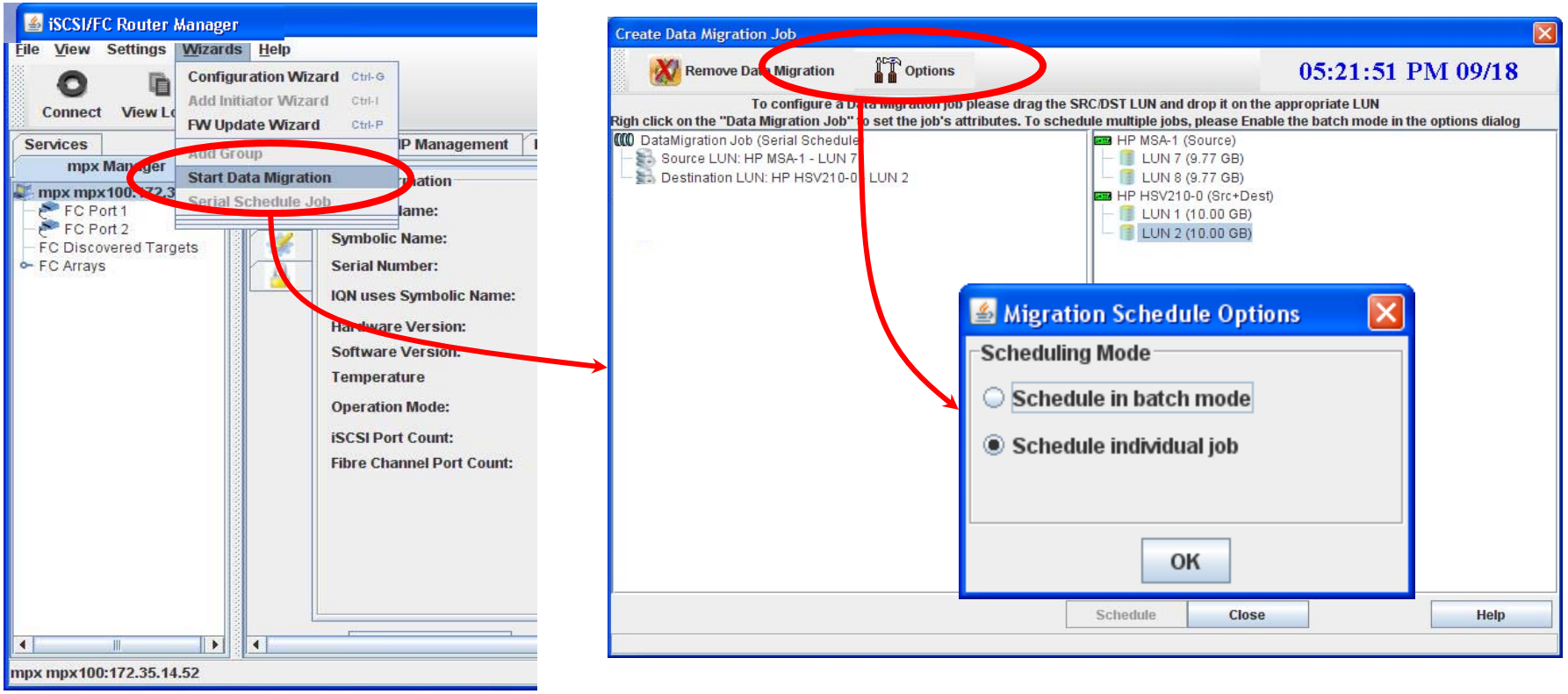
Create Migration Job Group

- **'Group 0' is always defined by default**
- **Create new groups for easy management**
  - 'Exchange', 'Database', 'Archive', etc.



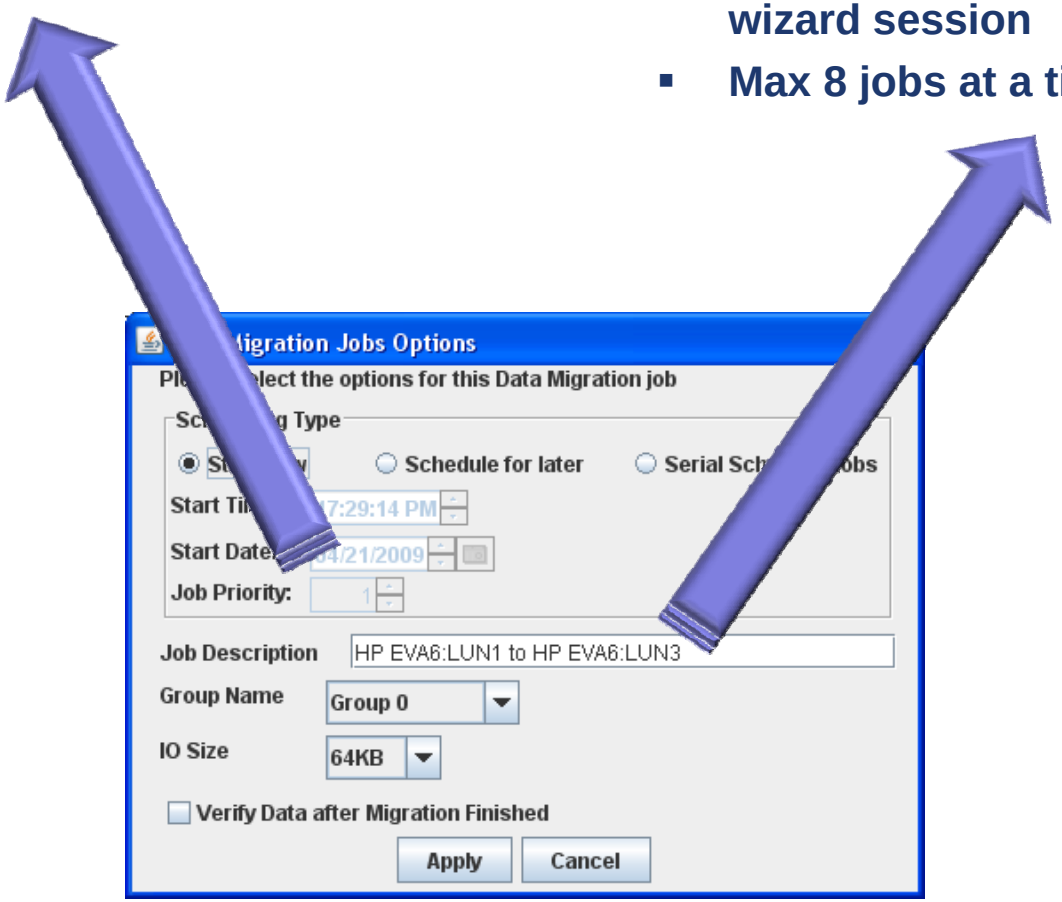
“Start Data Migration” Wizard

- Start the Wizard from the menu
- Select Wizard Option



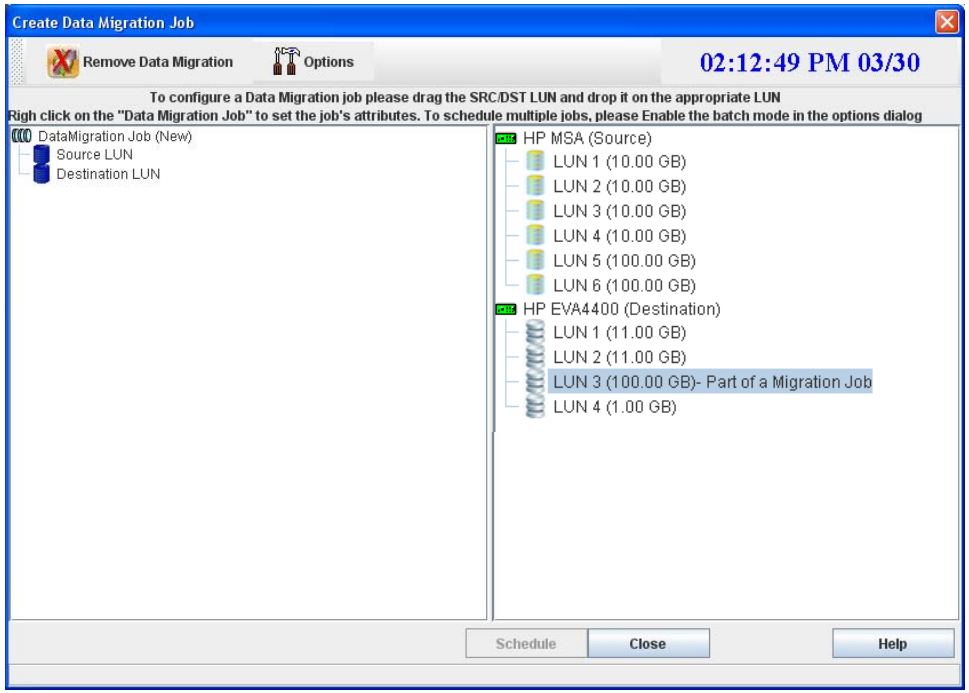
“Start Migration” Wizard Options

- **Individual Job**
  - Attributes apply to just one job
- **Batch Mode**
  - Attributes apply to all jobs in the wizard session
  - Max 8 jobs at a time

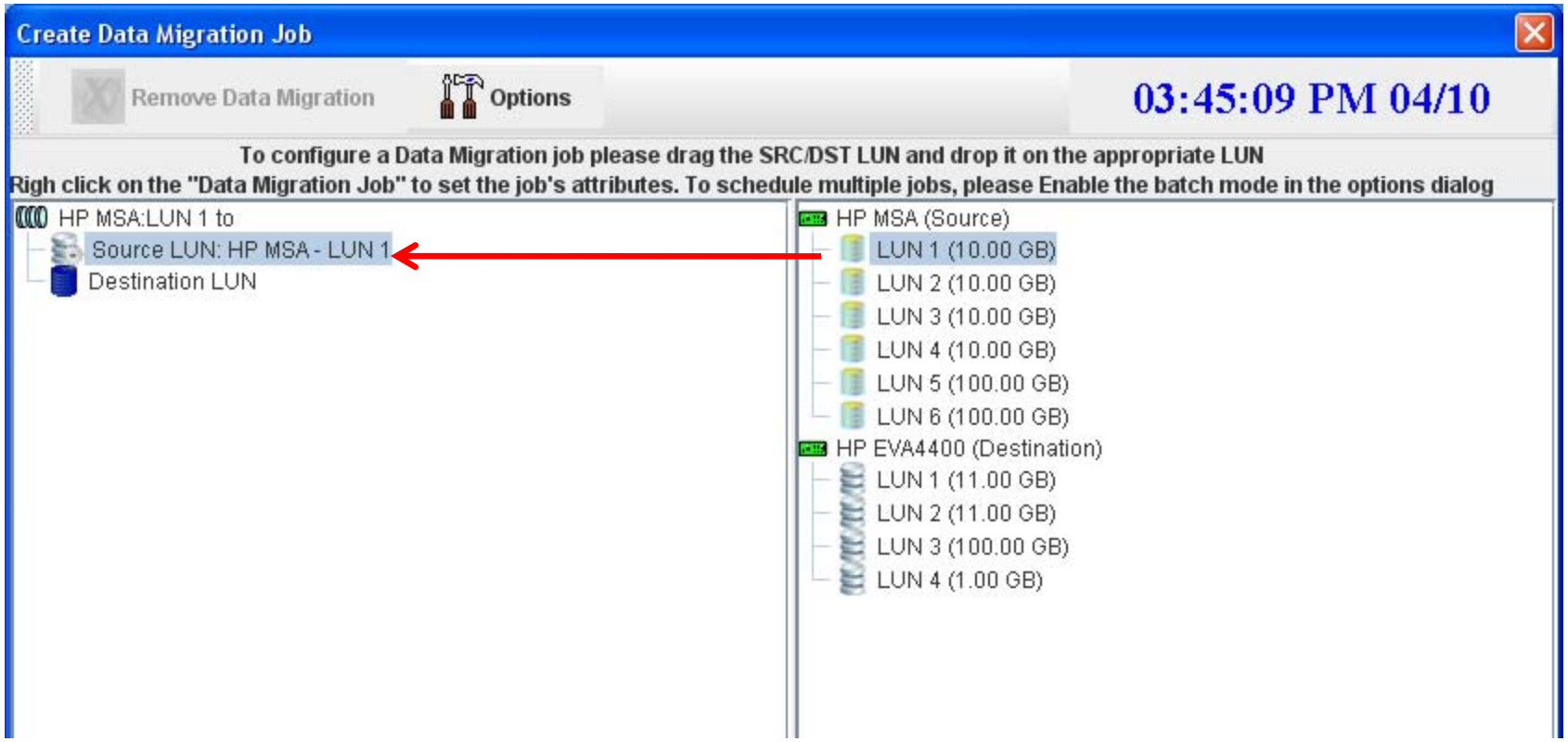


Configure Migration Job

- **A new “empty” Job is shown**
- **Drag-and-drop Source & Destination LUNs**
  - For individual Jobs “Job Options” will pop up with each job creation
  - For “Batch Mode” option, “Schedule” button is required after multiple “Drag and Drops” to configure these jobs

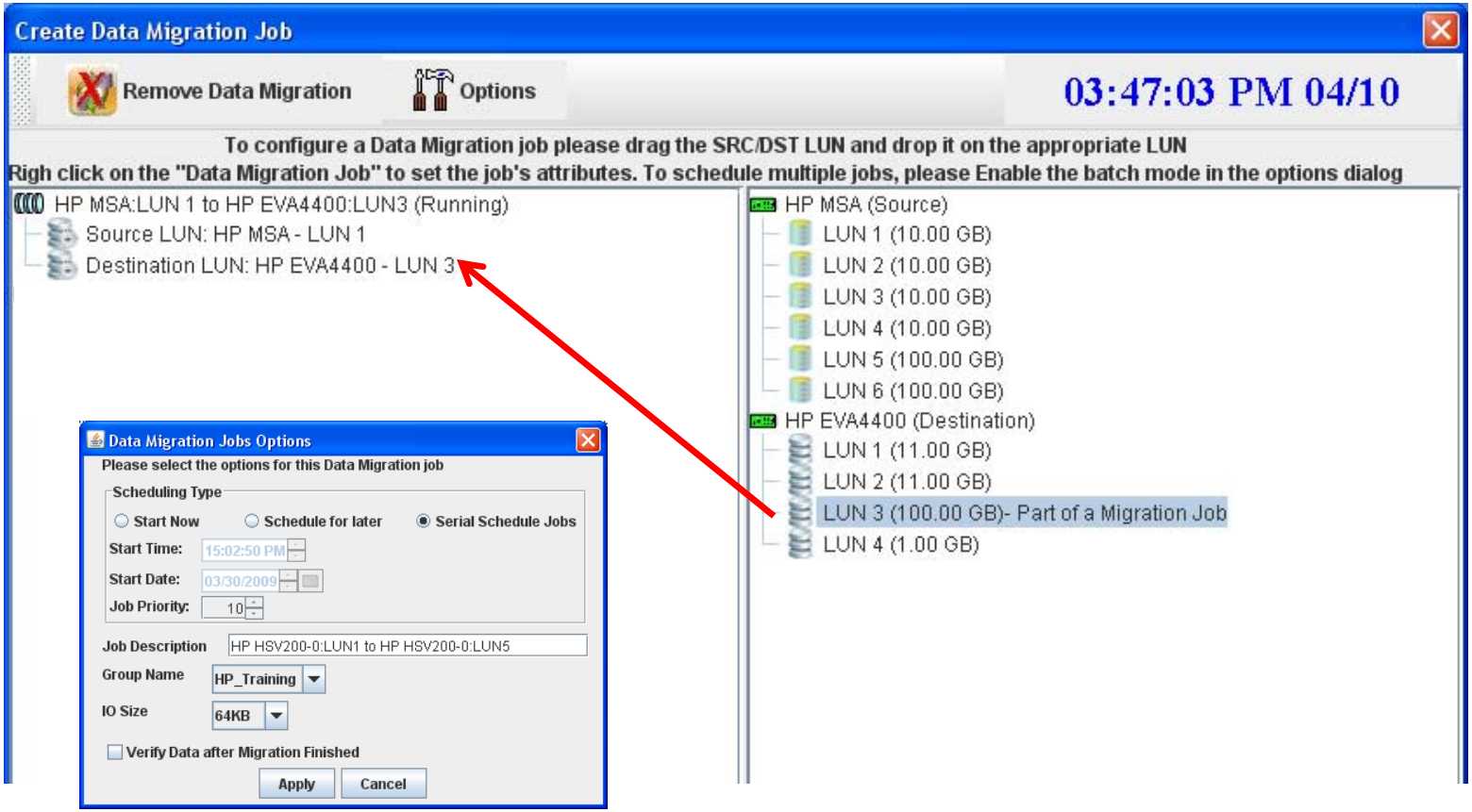

Create Data Migration Job
Remove Data Migration
Options
02:12:49 PM 03/30
To configure a Data Migration job please drag the SRC/DST LUN and drop it on the appropriate LUN
Righ click on the "Data Migration Job" to set the job's attributes. To schedule multiple jobs, please Enable the batch mode in the options dialog
DataMigration Job (New)
Source LUN
Destination LUN
HP MSA (Source)
LUN 1 (10.00 GB)
LUN 2 (10.00 GB)
LUN 3 (10.00 GB)
LUN 4 (10.00 GB)
LUN 5 (100.00 GB)
LUN 6 (100.00 GB)
HP EVA4400 (Destination)
LUN 1 (11.00 GB)
LUN 2 (11.00 GB)
LUN 3 (100.00 GB)- Part of a Migration Job
LUN 4 (1.00 GB)
Schedule
Close
Help

Drag LUN to Source


Create Data Migration Job
Remove Data Migration
Options
03:45:09 PM 04/10
To configure a Data Migration job please drag the SRC/DST LUN and drop it on the appropriate LUN
Righ click on the "Data Migration Job" to set the job's attributes. To schedule multiple jobs, please Enable the batch mode in the options dialog
HP MSA:LUN 1 to
Source LUN: HP MSA - LUN 1
Destination LUN
HP MSA (Source)
LUN 1 (10.00 GB)
LUN 2 (10.00 GB)
LUN 3 (10.00 GB)
LUN 4 (10.00 GB)
LUN 5 (100.00 GB)
LUN 6 (100.00 GB)
HP EVA4400 (Destination)
LUN 1 (11.00 GB)
LUN 2 (11.00 GB)
LUN 3 (100.00 GB)
LUN 4 (1.00 GB)

- **Dragging Source to Destination is not allowed**

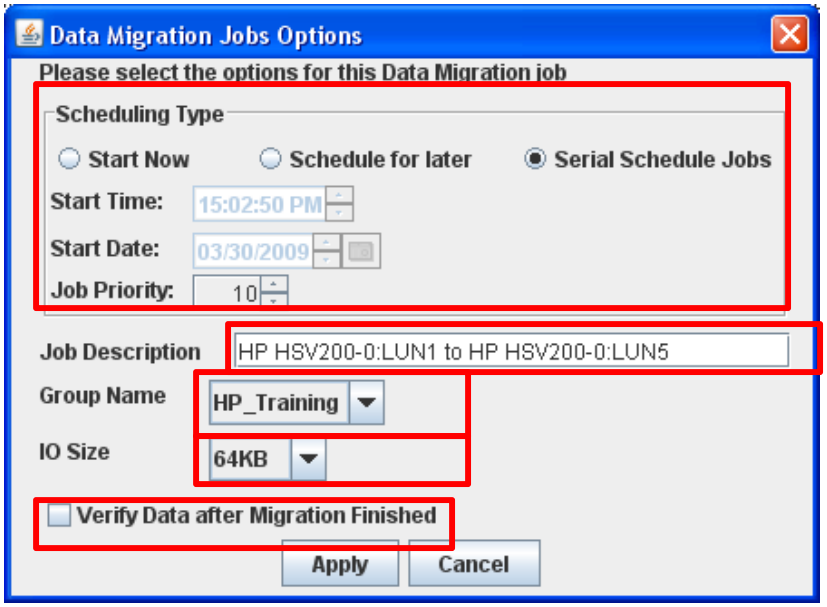
Drag LUN to Destination


Create Data Migration Job
Remove Data Migration
Options
03:47:03 PM 04/10
To configure a Data Migration job please drag the SRC/DST LUN and drop it on the appropriate LUN
Righ click on the "Data Migration Job" to set the job's attributes. To schedule multiple jobs, please Enable the batch mode in the options dialog
HP MSA:LUN 1 to HP EVA4400:LUN3 (Running)
Source LUN: HP MSA - LUN 1
Destination LUN: HP EVA4400 - LUN 3
HP MSA (Source)
LUN 1 (10.00 GB)
LUN 2 (10.00 GB)
LUN 3 (10.00 GB)
LUN 4 (10.00 GB)
LUN 5 (100.00 GB)
LUN 6 (100.00 GB)
HP EVA4400 (Destination)
LUN 1 (11.00 GB)
LUN 2 (11.00 GB)
LUN 3 (100.00 GB)- Part of a Migration Job
LUN 4 (1.00 GB)
Data Migration Jobs Options
Please select the options for this Data Migration job
Scheduling Type
Start Now
Schedule for later
Serial Schedule Jobs
Start Time:
15:02:50 PM
Start Date:
03/30/2009
Job Priority:
10
Job Description
HP HSV200-0:LUN1 to HP HSV200-0:LUN5
Group Name
HP_Training
IO Size
64KB
Verify Data after Migration Finished
Apply
Cancel

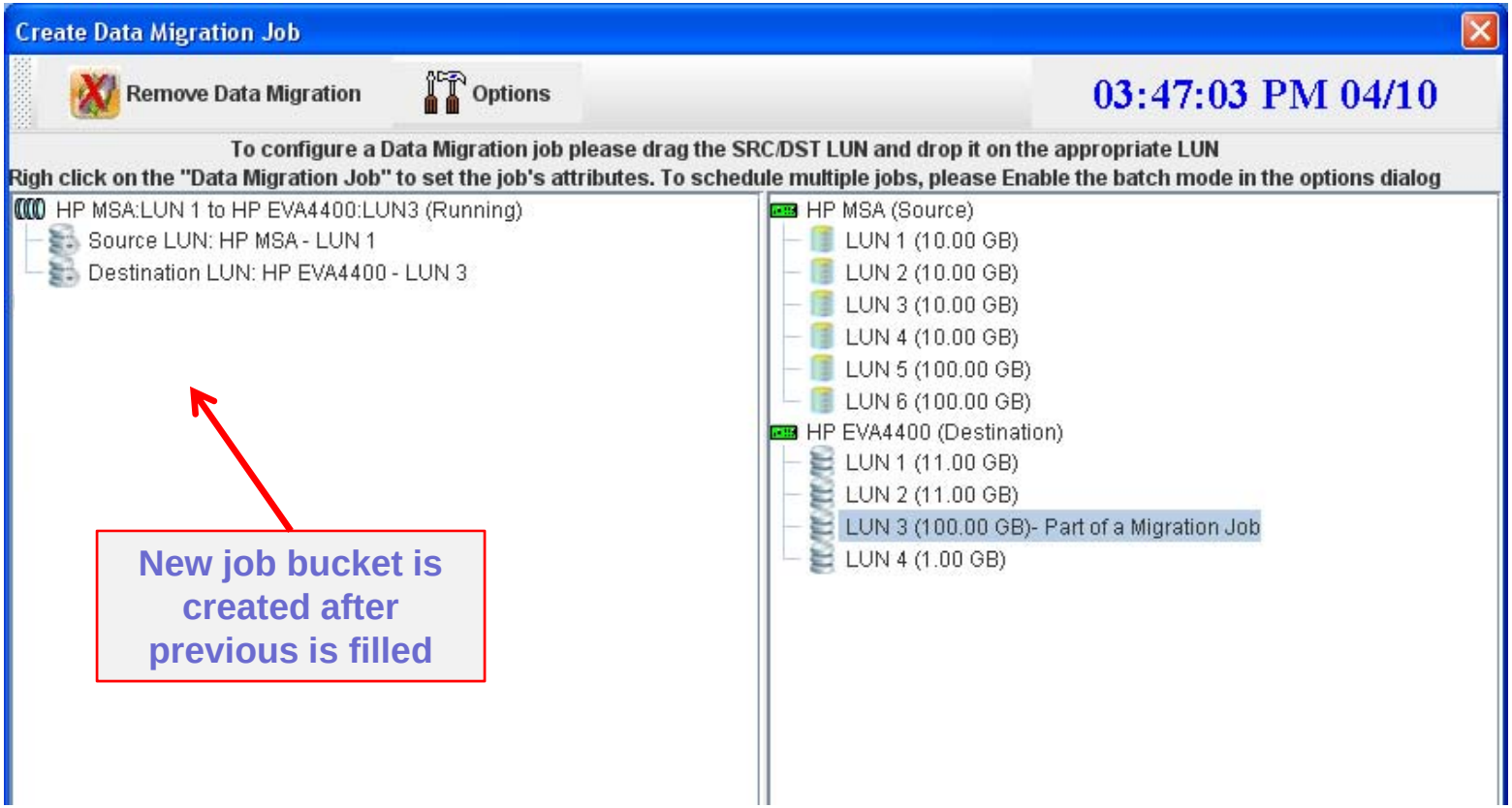
- Destination size must be >= Source size
- Warning generated if Destination LUN appears to have valid data
- Destination LUN is allowed only in a single migration Job

Select all the Job attributes

- Scheduling Option
- Job Description
- Job Group
- IO size
- Verify After Migration

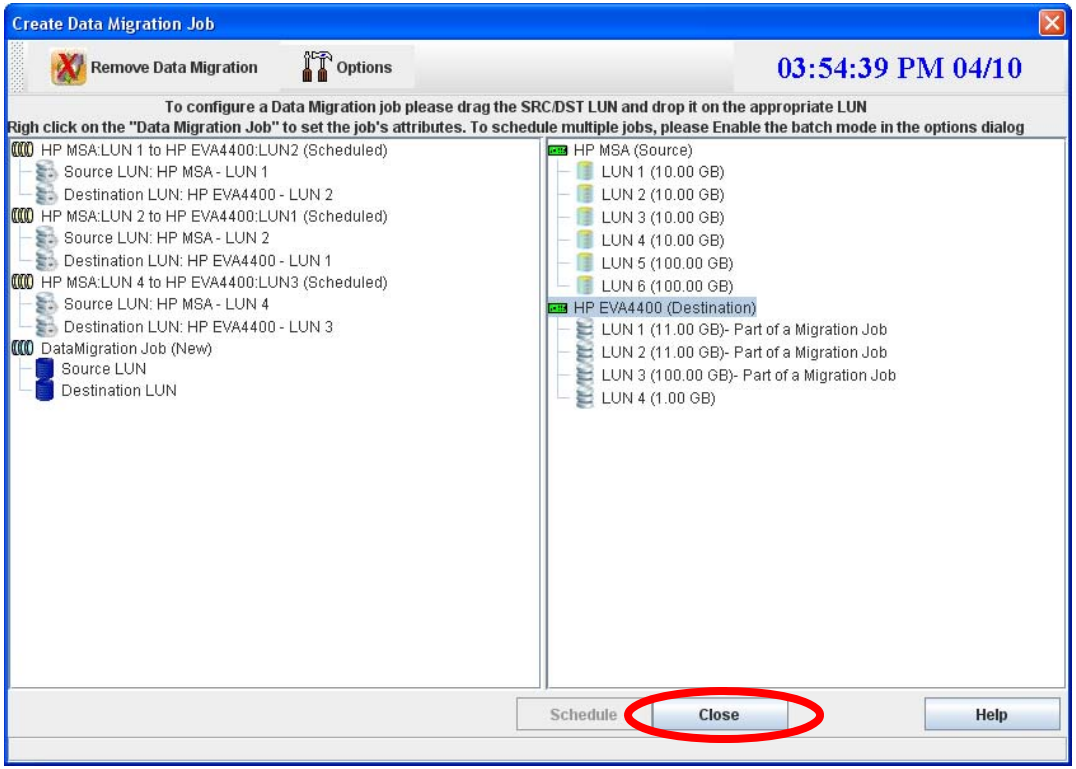


Ready for next Job


Create Data Migration Job
Remove Data Migration
Options
03:47:03 PM 04/10
To configure a Data Migration job please drag the SRC/DST LUN and drop it on the appropriate LUN
Righ click on the "Data Migration Job" to set the job's attributes. To schedule multiple jobs, please Enable the batch mode in the options dialog
HP MSA:LUN 1 to HP EVA4400:LUN3 (Running)
Source LUN: HP MSA - LUN 1
Destination LUN: HP EVA4400 - LUN 3
HP MSA (Source)
LUN 1 (10.00 GB)
LUN 2 (10.00 GB)
LUN 3 (10.00 GB)
LUN 4 (10.00 GB)
LUN 5 (100.00 GB)
LUN 6 (100.00 GB)
HP EVA4400 (Destination)
LUN 1 (11.00 GB)
LUN 2 (11.00 GB)
LUN 3 (100.00 GB)- Part of a Migration Job
LUN 4 (1.00 GB)
New job bucket is created after previous is filled

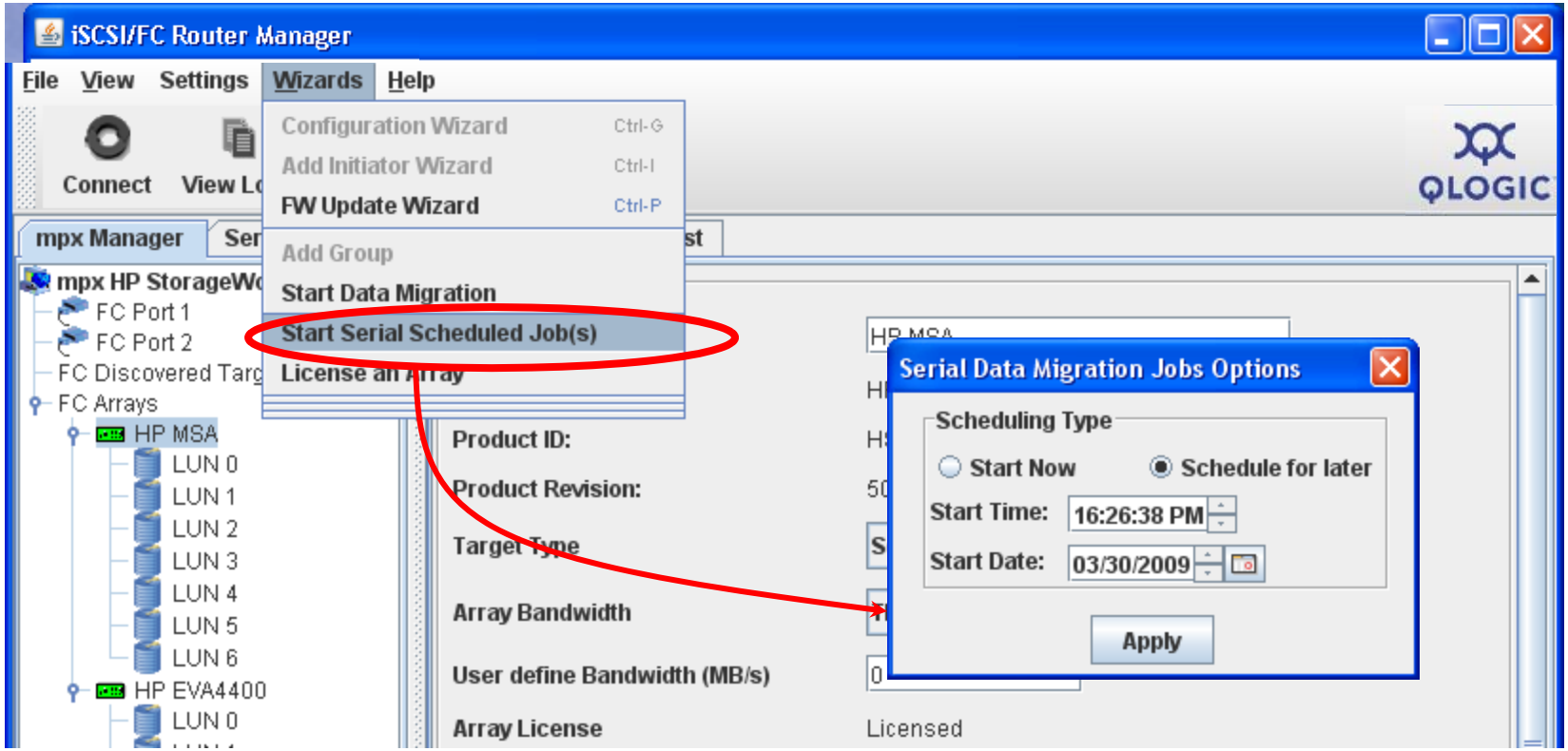
Jobs Creation Completed

- You may close the wizard


Create Data Migration Job
Remove Data Migration
Options
03:54:39 PM 04/10
To configure a Data Migration job please drag the SRC/DST LUN and drop it on the appropriate LUN
Righ click on the "Data Migration Job" to set the job's attributes. To schedule multiple jobs, please Enable the batch mode in the options dialog
HP MSA:LUN 1 to HP EVA4400:LUN2 (Scheduled)
Source LUN: HP MSA - LUN 1
Destination LUN: HP EVA4400 - LUN 2
HP MSA:LUN 2 to HP EVA4400:LUN1 (Scheduled)
Source LUN: HP MSA - LUN 2
Destination LUN: HP EVA4400 - LUN 1
HP MSA:LUN 4 to HP EVA4400:LUN3 (Scheduled)
Source LUN: HP MSA - LUN 4
Destination LUN: HP EVA4400 - LUN 3
DataMigration Job (New)
Source LUN
Destination LUN
HP MSA (Source)
LUN 1 (10.00 GB)
LUN 2 (10.00 GB)
LUN 3 (10.00 GB)
LUN 4 (10.00 GB)
LUN 5 (100.00 GB)
LUN 6 (100.00 GB)
HP EVA4400 (Destination)
LUN 1 (11.00 GB)- Part of a Migration Job
LUN 2 (11.00 GB)- Part of a Migration Job
LUN 3 (100.00 GB)- Part of a Migration Job
LUN 4 (1.00 GB)
Schedule
Close
Help

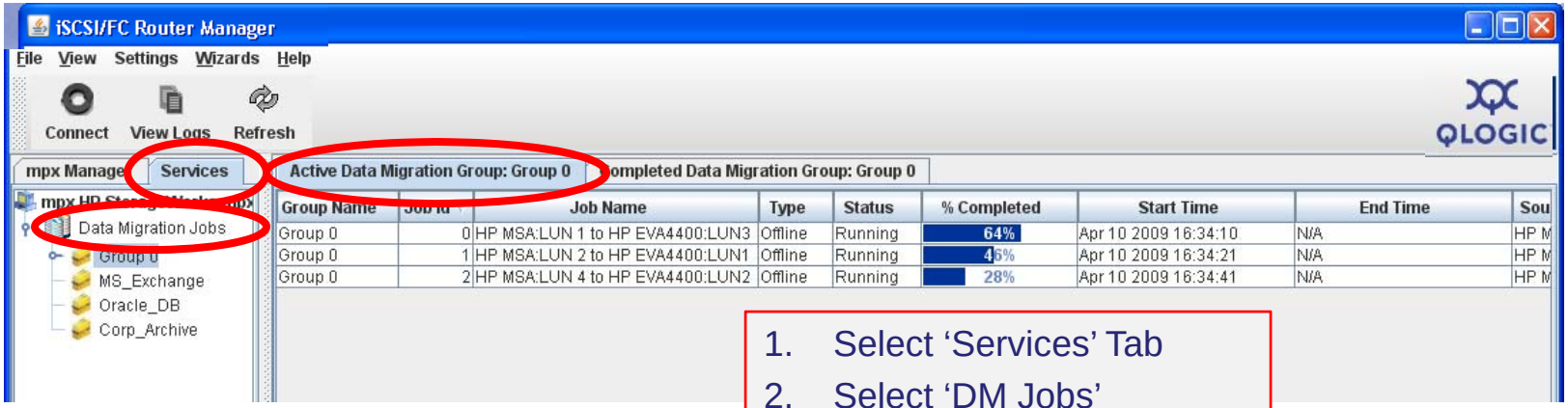
Serial Schedule Wizard

- If one or multiple jobs were created with serial scheduling option, Serial schedule must be configured
- Select from wizard pull-down menu



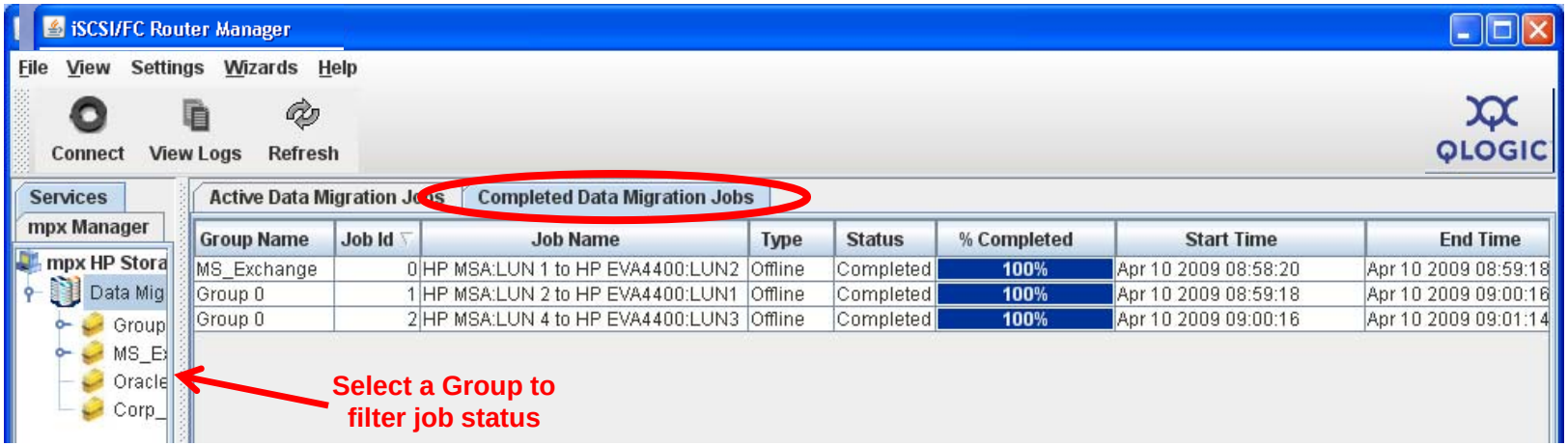
Job Status Monitoring

- Active migration jobs


iSCSI/FC Router Manager
File View Settings Wizards Help
Connect View Logs Refresh
QLOGIC
mpx Manage
Services
Active Data Migration Group: Group 0
ompleted Data Migration Group: Group 0
Data Migration Jobs
Group 0
MS_Exchange
Oracle_DB
Corp_Archive
Group Name | Job Id | Job Name | Type | Status | % Completed | Start Time | End Time | Sou
Group 0 | 0 | HP MSA:LUN 1 to HP EVA4400:LUN3 | Offline | Running | 64% | Apr 10 2009 16:34:10 | N/A | HP M
Group 0 | 1 | HP MSA:LUN 2 to HP EVA4400:LUN1 | Offline | Running | 46% | Apr 10 2009 16:34:21 | N/A | HP M
Group 0 | 2 | HP MSA:LUN 4 to HP EVA4400:LUN2 | Offline | Running | 28% | Apr 10 2009 16:34:41 | N/A | HP M

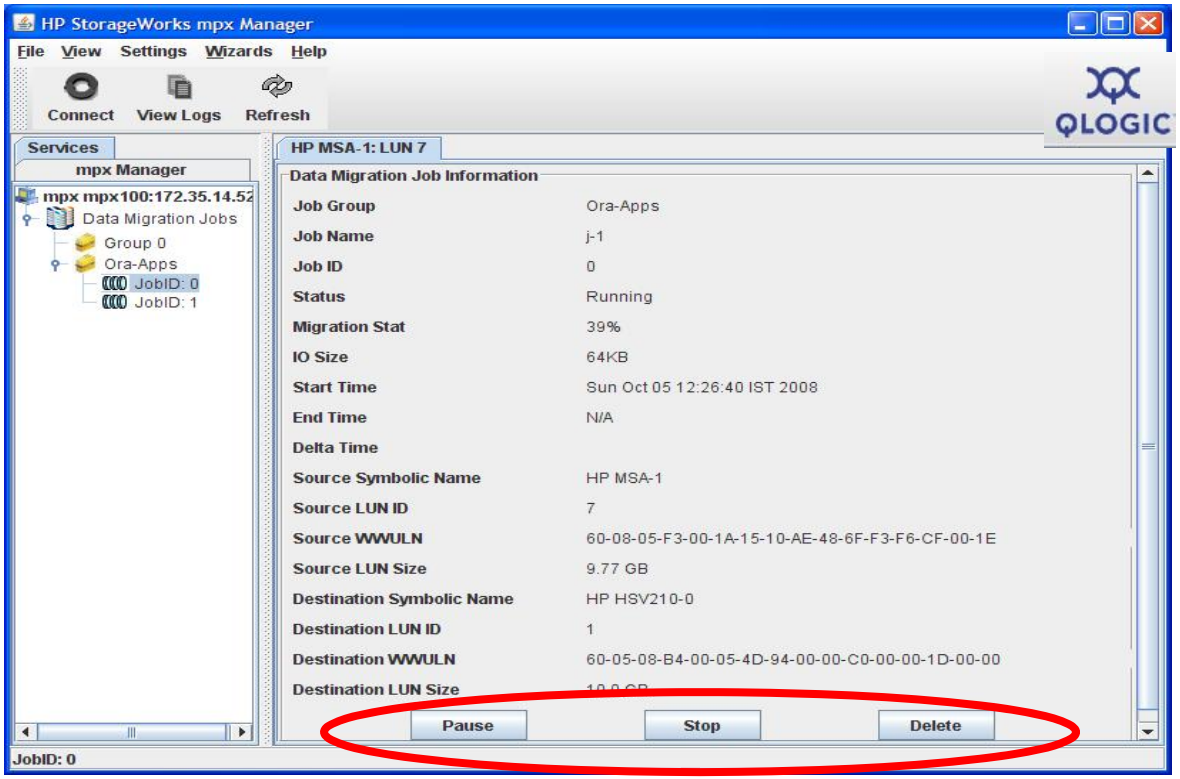
1. Select ‘Services’ Tab
2. Select ‘DM Jobs’
3. Select ‘Active DM Jobs’

- Completed migration jobs


iSCSI/FC Router Manager
File View Settings Wizards Help
Connect View Logs Refresh
QLOGIC
Services
mpx Manager
mpx HP Stora
Data Mig
Group
MS_E
Oracle
Corp_
Active Data Migration Jo
Completed Data Migration Jobs
Group Name | Job Id | Job Name | Type | Status | % Completed | Start Time | End Time
MS_Exchange | 0 | HP MSA:LUN 1 to HP EVA4400:LUN2 | Offline | Completed | 100% | Apr 10 2009 08:58:20 | Apr 10 2009 08:59:18
Group 0 | 1 | HP MSA:LUN 2 to HP EVA4400:LUN1 | Offline | Completed | 100% | Apr 10 2009 08:59:18 | Apr 10 2009 09:00:16
Group 0 | 2 | HP MSA:LUN 4 to HP EVA4400:LUN3 | Offline | Completed | 100% | Apr 10 2009 09:00:16 | Apr 10 2009 09:01:14
Select a Group to filter job status

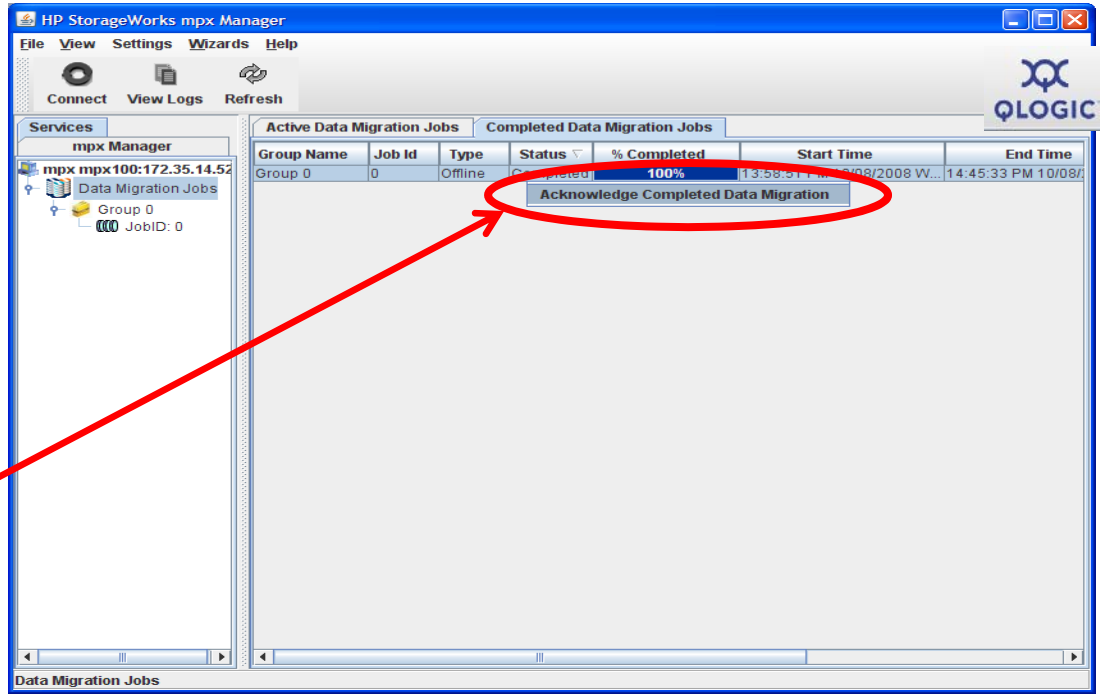
Job Control

- **Stop, Pause, Resume, Delete**
  - A paused job, can be resumed at point of interruption
  - A stopped job will restart from beginning



Acknowledge Migration Job

- **All completed jobs must be acknowledged**
  - Destination LUNs used in active migration are unavailable for new job until acknowledge
- **Jobs stay in the system until acknowledged or deleted**

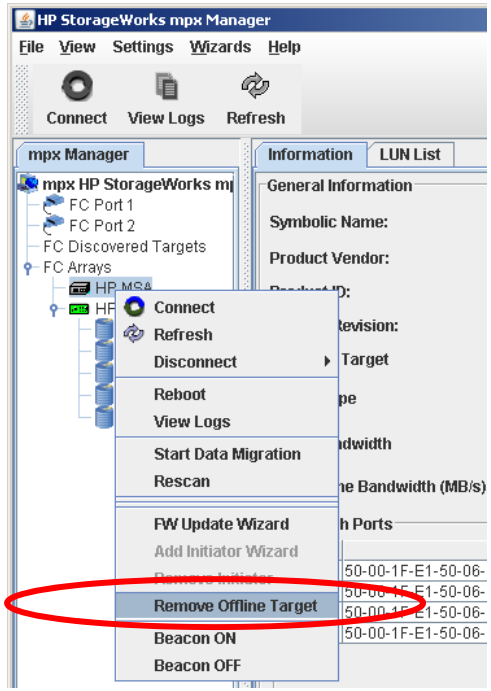


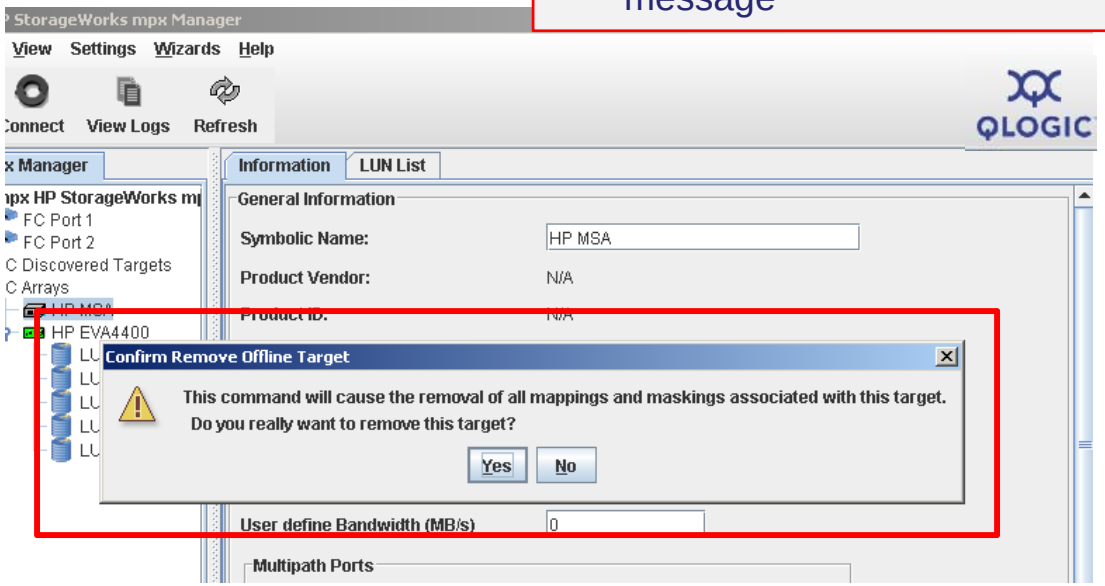
Right-click on job to view ACK menu

Removing an array

- **All jobs to this array must be acknowledged or deleted**
- **Array must be offline to the router before array can be removed**
  - Zone out array ports from router ports. Within 1 min array will go offline
- **To Remove the array:**

1. Right click on the FC array to be removed
2. Select Remove Offline Target
3. Confirm “YES” to the warning message



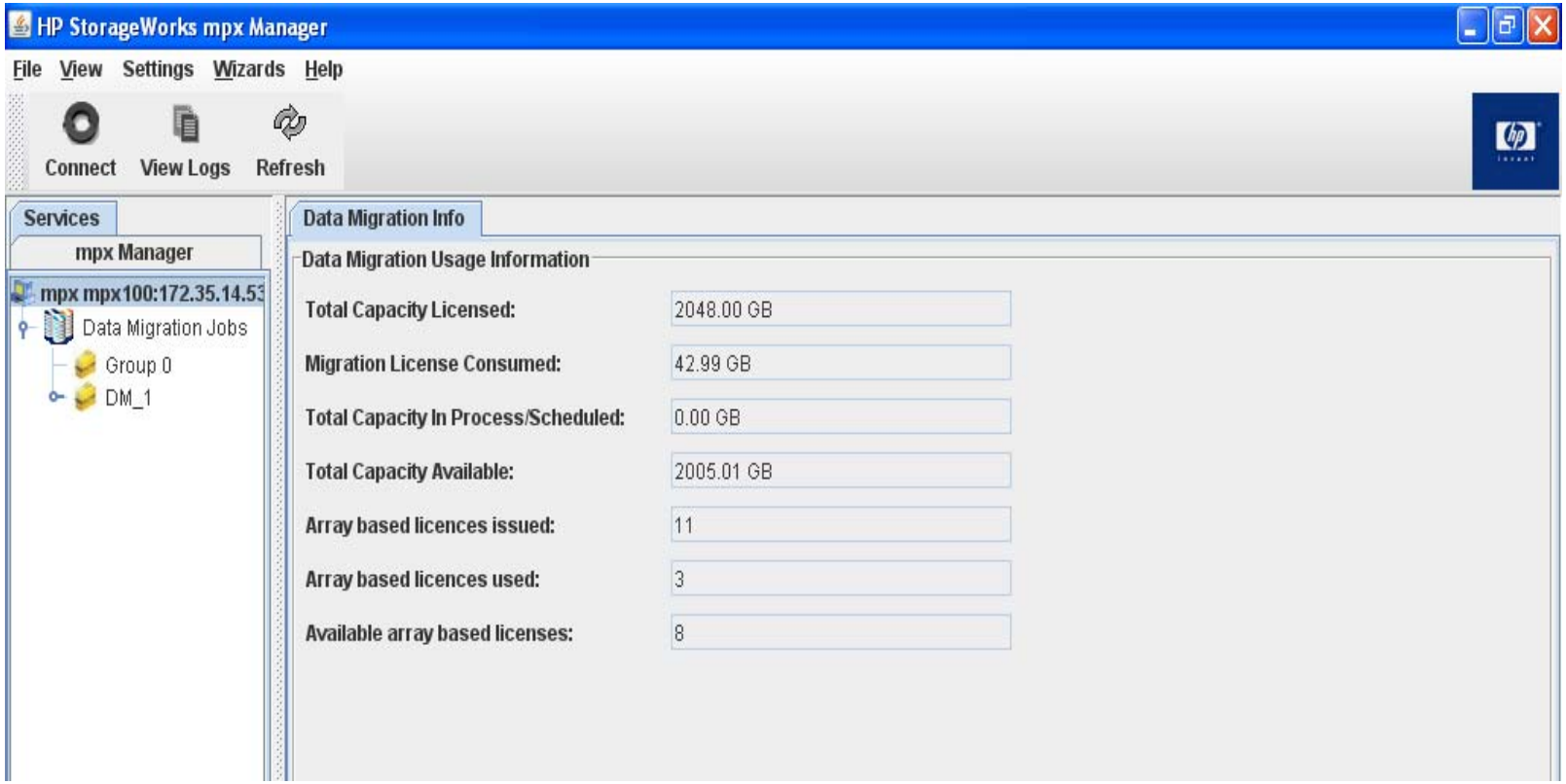


Completing a Migration Project

- Export the Migration Logs out of the router and save them somewhere on your system. These logs are your records for the project.
- Clear Migration Logs
- Remove arrays used in migration. Array used in migration are stored in persistent storage.
- If array based license was used for this project and if you plan on using this array again for migration, you may keep the license when removing the array.

License Usage

- Check licenses used and available
- Failed jobs don’t consume licenses



Best Practices

- Migration Logs
  - Always clear Migration Logs at the start of the project
  - Export Migration logs onto your system after project completes.
- If the “Source” array controllers are configured in redundant fabrics, configure one 6140 port into “Fabric A” and the second port into “Fabric B”.
- Plan migration jobs to run simultaneously:
  - LUNs for migration are balanced across two array controllers.
  - Max 4-8 Jobs will be executing together

Best Practices

- Use array bandwidth limiting feature if other LUNs on a source array are being used by application
- Configure similar size jobs on a same priority when using “Serial Scheduling”
- Use “Rescan” feature to discover arrays after the first “Data” LUN from the storage array is presented to 6140
- Array reconfiguration:
  - If the Lun presentation from the array to the 6140 is changed, Hit refresh button 2-3 times to see the changes. Please wait for few seconds between retries as 6140 will be running discovery process.

Best practices

- Upon completion of the project, please remove the array(s).
- If the Array based license was used and array will not be used in the next project, remove the license for this array.
- Array Licenses:
  - For Array based license use, if you reconfigure the “removed” array, new license may be required.
  - Max. 32 array based licenses can be “in use” at anytime.
- Use “Verify” Option sparingly: it uses 3x migration time
- Use array-based license if
  - Ongoing replications of LUNs required for the array

Limitations

- Maximum number of arrays configured at any given point in time is 7. Arrays stored in persistence will consume resources even if array is offline and no longer needed
  - Once the migration is complete it is recommended that you “remove” the arrays.
- Maximum number of array based licenses “in use” are limited to 32.
- Migration Logs will wrap after 1024 migration log entries.
  - Current release (fw version 2.4.1.0dms) has an open issue on migration Log. When migration Log wraps you may lose all of the migration log entries. Work around is to save migration logs after approximately 200 migration jobs on a single project.

Thank You

- Q & A